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I. DESCRIPTION OF THE CLIMATE SYSTEM (APRIL 2012)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

In the Tropical Pacific the situation continue to evolve (fig.1) especially in the Eastern part of the basin. The SSTs are warming in the equatorial wave guide where Above Normal temperatures are observed. Close to South-America in the subtropical regions one can see also positive anomalies. In both hemispheres, the positive anomaly in the western part which extend to the higher latitudes continue to decrease. Even, it becomes close to normal in the South-Western part of the Pacific basin and along the SPCZ.

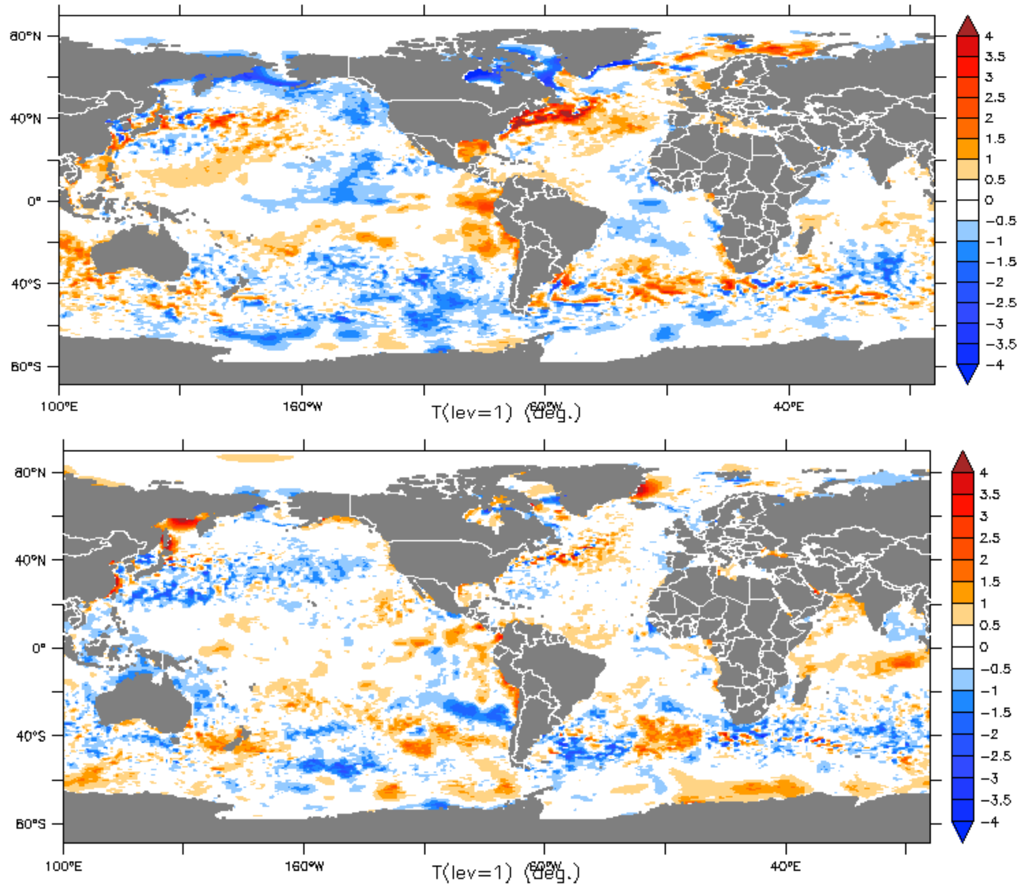


fig.1: top : SSTs Anomalies in April 2012 (°C) (reference 1950-2008)
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

The Atlantic show little evolutions in the tropics. However, one can note some positive tendency (warming) in the Guinean Gulf and close to Northern coast of South America. In the Southern hemisphere the greatest evolutions are in the mid-latitude.
The Indian Ocean is mostly warming especially South to the equatorial waveguide and in the North-Western part of the basin.

In subsurface (fig.2), in the equatorial Pacific waveguide, the heat content anomalies show some similarity with the SSTs and thermocline depth anomalies (see fig. 5). One can note positive anomalies in the most Western and Eastern part. Interestingly, one can see some trace of Eastward extension of the western anomaly, consistently with the vertical cross-section (see fig. 4).
In Tropical Atlantic, the patterns are quite fragmented and show conditions not too far from normal.
In the equatorial wave guide of the Indian Ocean, the heat content is consistent with the SST signal in the regions close to the equatorial waveguide.

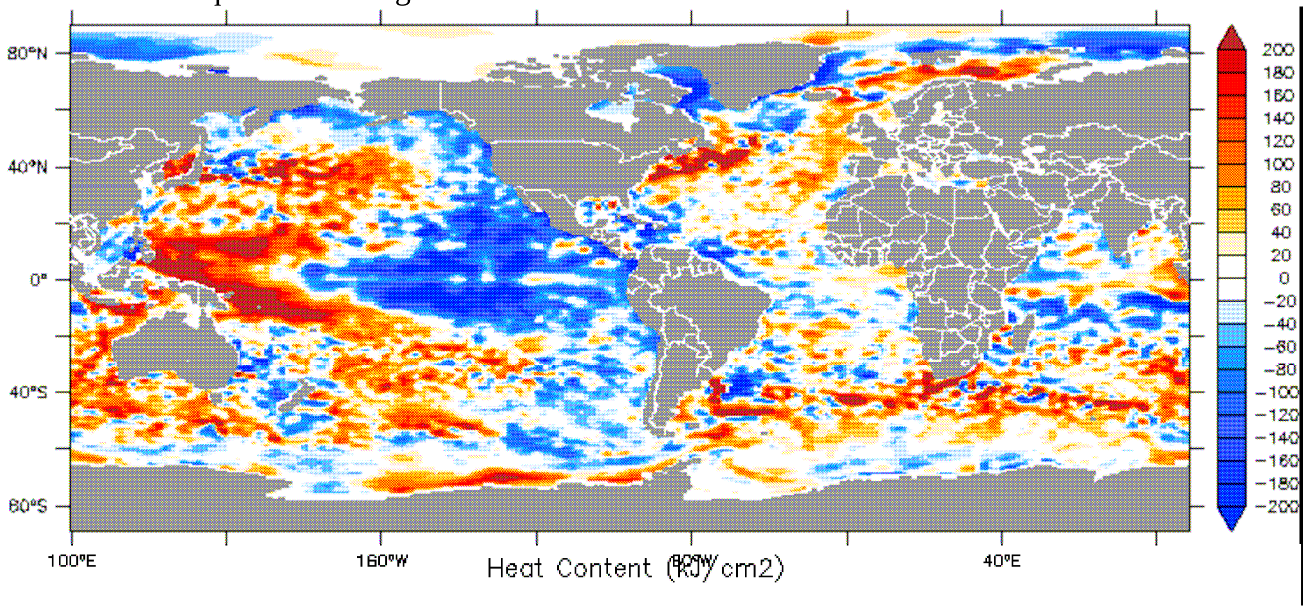


fig.2: map of Heat Content Anomalies (first 300m) in April 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

I.1.b Pacific Basin

In April, a positive anomaly in the Eastern equatorial Pacific continue to develop (fig.3) while close to the date line the negative anomaly related to La Niña has vanished with respect of the previous month. Over most of the equatorial part of the basin the negative zonal Trade Wind anomaly has disappeared consistently with the SOI.

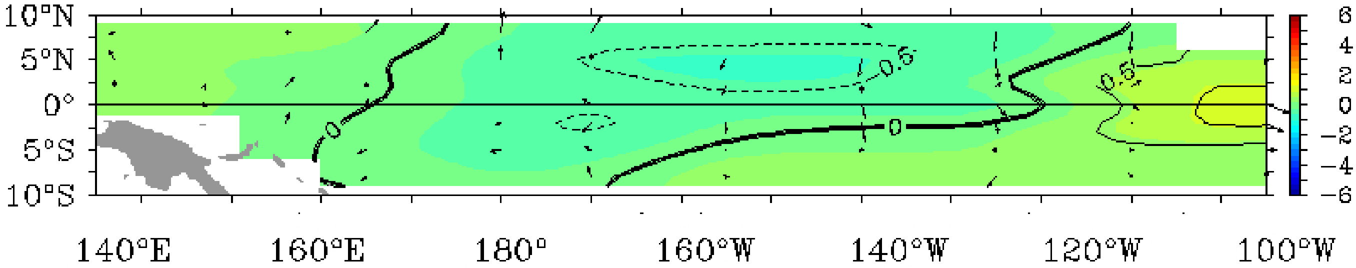


fig.3: SST Anomalies and Wind anomalies in March 2012 over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies are still negative in the central part while they return to close to Normal in the Eastern part of the basin. The monthly averages in March are respectively -0,3°C, -0,4°C, 0,1°C and +1,3°C from West to East (Neutral phase and coastal event).

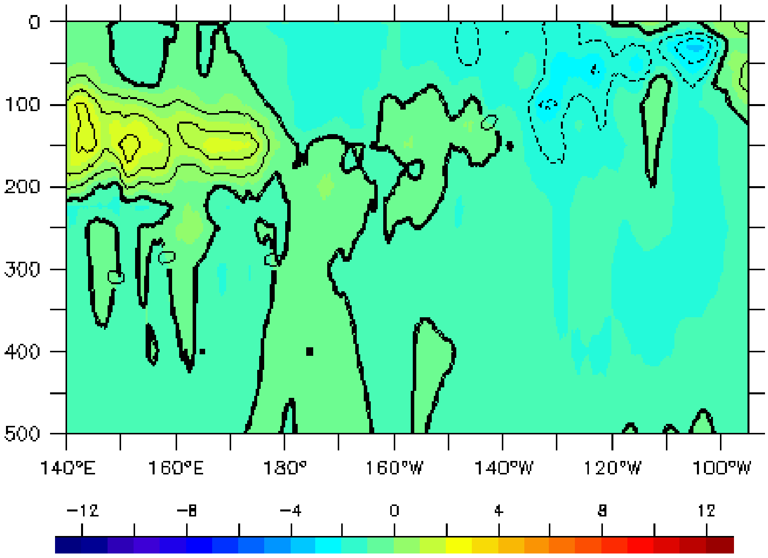


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in April 2012
http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) the warming in the eastern part is now visible under the surface and the positive anomaly is now conspicuous up to 100m depth. On the Western side in the warm reservoir the positive anomaly has increased and a clear Eastward propagation is visible indicating some oceanic dynamic potential at the thermocline level. To be quoted that the last MJO forecast show some MJO activity for the next month, especially close to the maritime continent.
Looking to the thermocline structure, in April over the Equatorial Pacific, the La Niña like dipole is disappearing (fig. 5). One can see the trace of the thermocline deepening on the most eastern part and also some trace of Kelvin wave propagation in the equatorial waveguide.

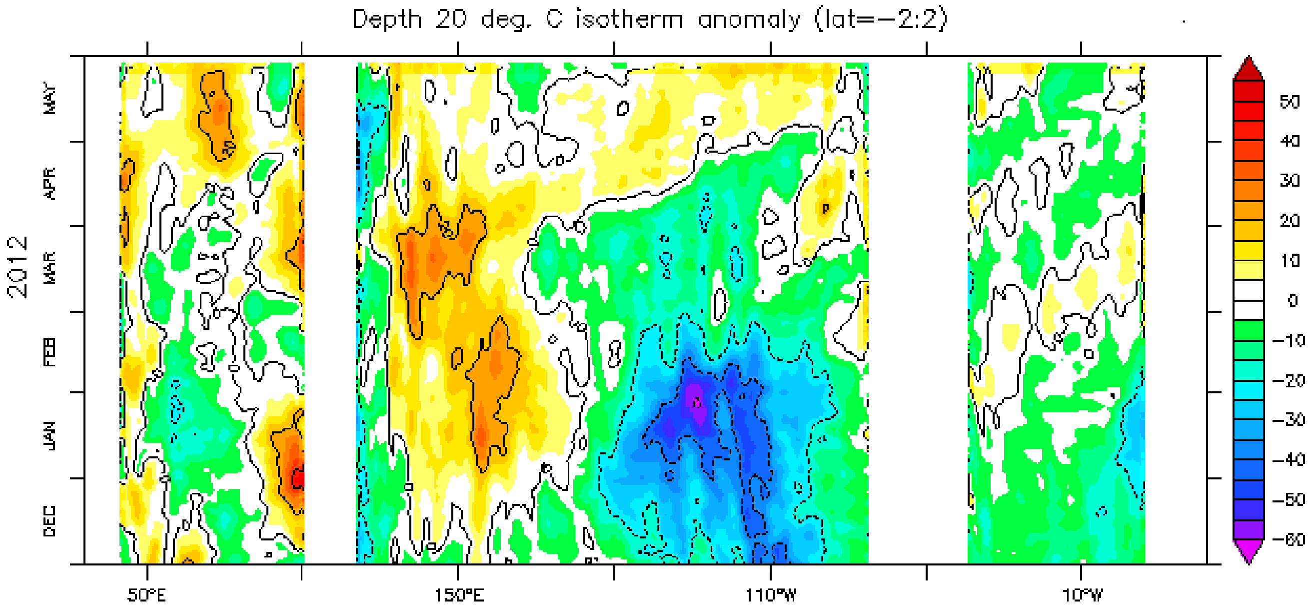


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

The Northern Tropical Atlantic ocean is now close to normal in the Western part while a negative anomaly develops in the Eastern part of the basin. In the equatorial waveguide the negative anomaly previously noted is vanishing consistently with the heat content behaviour. In the Southern Hemisphere (Tropics and sub-tropics), one can notice still below normal conditions and a dipole pattern between the mid-latitudes and the tropics. In the equatorial waveguide (fig. 5) there is some trace of a Kelvin wave propagation which leads to a warming of subsurface temperature on Eastern side at the end of the period. The signal is consistent with the surface signal (see SST comments) and the heat content.

I.1.d Indian Basin

Dans l'océan Indien, dans les régions nord-ouest et équatoriale les SST sont proches de la normale, conséquence du réchauffement général dans ces régions (après le refroidissement du mois dernier. En conséquence, le DMI (Dipole Mode Index – i.e. indice du Dipole Indien) est revenue à une phase neutre.
Dans l’hémisphère Sud, dans les régions tropicale et sub-tropicale, on observe encore un contraste fort entre la partie Est (proche de l’Australie) et la partie centrale.
In the Indian Ocean, in the equatorial and North-Western regions, SSTs are close to normal conditions. Consequently, the DMI returns to a neutral phase. In the Southern hemisphere, the Eastern part is still above normal while the central part is mostly below normal. In subsurface the thermocline is deeper than normal elsewhere in the equatorial waveguide.

I.2. ATMOSPHERE

I.2.a Atmosphere : General Circulation

Looking to the Velocity Potential Anomaly field in the high troposphere (fig. 6), the patterns of General Circulation (especially Hadley-Walker circulations) show dramatic evolutions with respect of the previous month. On can remark the dramatic decrease of the Divergent Circulation anomaly (negative anomaly) over the Western Pacific which is now located only over New-Guinea without any meridionnal extension.
Generally speaking, there is several sub-regional divergent circulation anomaly patterns which indicate that being close to neutral conditions and in the ending phase of La Niña, there is a weak ocean/atmosphere coupling related to weak SST forcing. The SOI is now negative (- 0.3) even if both contributors (Tahiti and Darwin) show positive anomalies.
A strong negative anomaly (divergent circulation anomaly ; upward anomaly motion) exists on the North-Western coast of South America in relationship with the SST anomaly. This anomaly is associated in the South with a positive anomaly related to a regional cell circulation. It is noticeable that this pattern could strengthen the surface wind and consequently weaken the warming in the eastern equatorial waveguide.
A large positive anomaly (convergent circulation anomaly ; downward anomaly motion) has developed over the Southern Atlantic likely in relationship with the cold SSTs in this area. Interestingly, this large scale pattern could influence the West African monsoon circulation by strengthening the Northward low level circulation. Associated to this pattern, there is a positive anomaly over the West part of the West African continent which could enhanced the meridionnal circulation over this regions. One have to quote that this pattern is likely related to the mid-latitude circulation over the North-East Atlantic.
Last the situation over the Indian regions is contrasted with a relative large scale convection (on the North Western side and the Oman Gulf) and the likely influence of the convergent circulation anomaly (over the southern hemisphere).

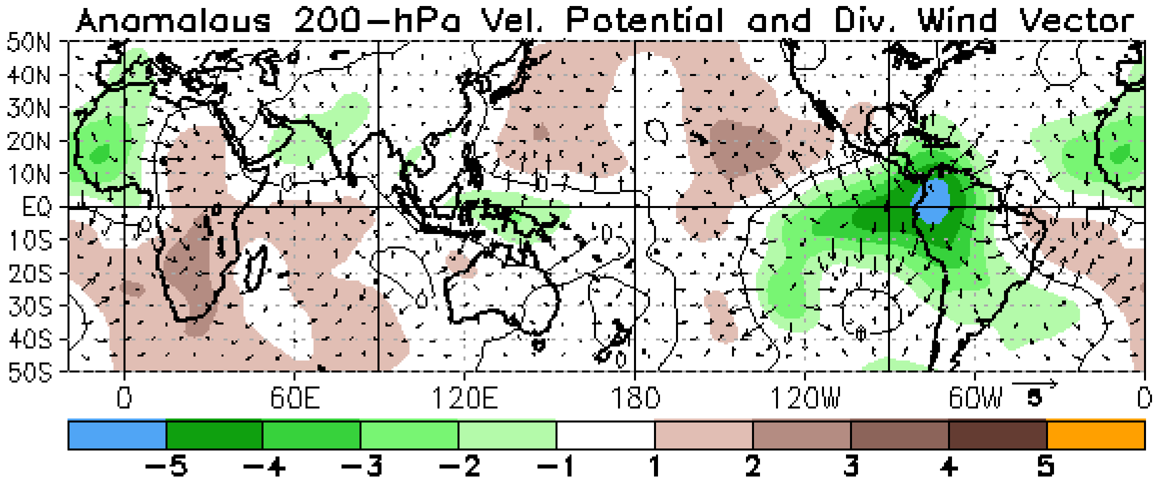


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly for April 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Looking to the Stream Function anomalies in the high troposphere (fig. 7), with respect of the previous month one can remark that anomalies are quite weak, especially across the Pacific Basin. This is consistent with the comment related to the velocity potential field, the weak SST forcing and consequently the weak ocean/atmosphere coupling. .

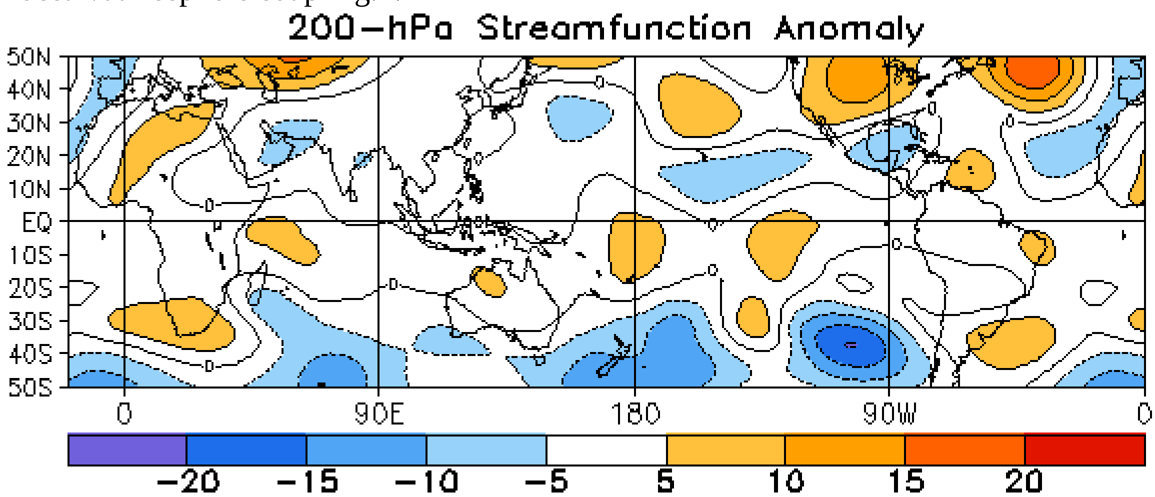


fig.7: Stream Function Anomalies at 200 hPa in April 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Over the Northern Hemisphere the Geopotential height at 500 hPa (fig. 8), the anomalies are just opposite to the one of the previous month. The tripole positive/negative/positive over North Atlantic/Europe/Russia is very consistent with observed perturbed conditions over Europe. In relationship with the previous discussion, the main active atmospheric modes in the Northern hemisphere (see next table) are mostly related to mid-latitude dynamic.

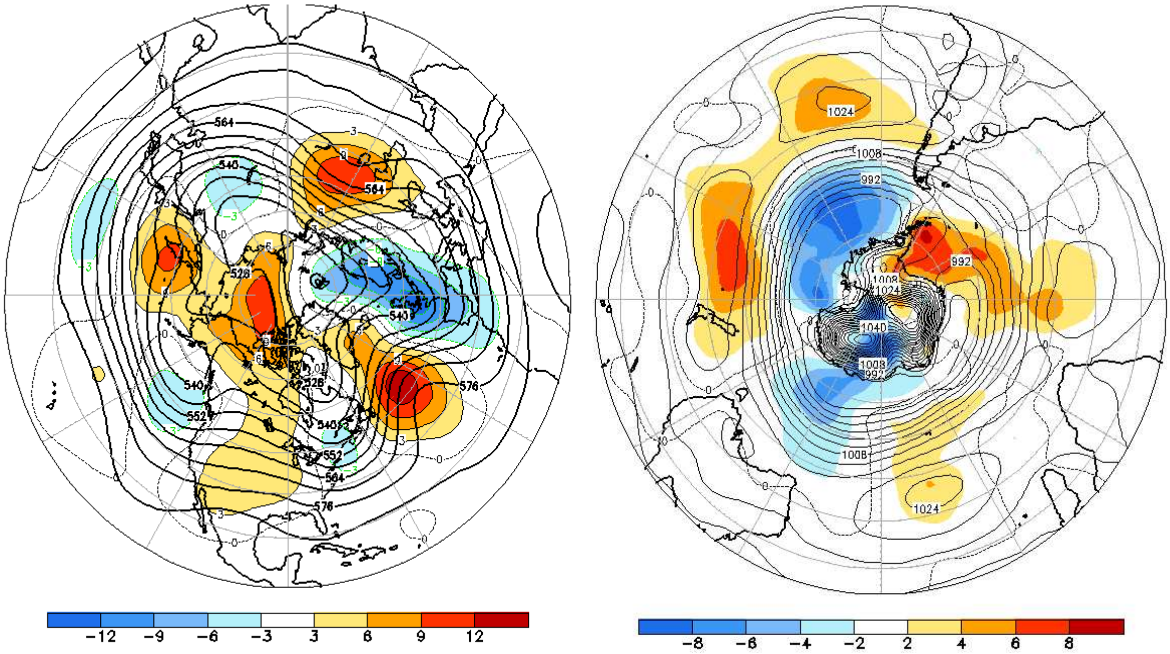


fig.8: Anomalies of Geopotential height at 500hPa in April 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 6 months :

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
APRIL 12	0.4	-0.3	-0.3	0.3	-0.1	---	-1.6	-0.9	-1.0
MAR 12	0.9	-0.6	0.8	-2.6	-0.2	---	1.3	-0.5	-1.4
FEB 12	0.0	-1.7	1.0	-0.3	0.7	0.4	-0.6	0.3	0.2
JAN 12	0.9	-1.8	-1.6	-1.9	0.1	-0.2	-0.5	0.6	-2.3
DEC 11	2.2	0.1	-0.4	---	0.1	0.7	-0.5	0.5	0.7
NOV 11	1.3	-0.1	0.4	-1.3	-0.8	---	2.1	0.6	-0.4
OCT 11	0.9	-0.3	1.1	-0.8	0.9	---	0.1	-0.3	0.3

http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

I.2.b Precipitation

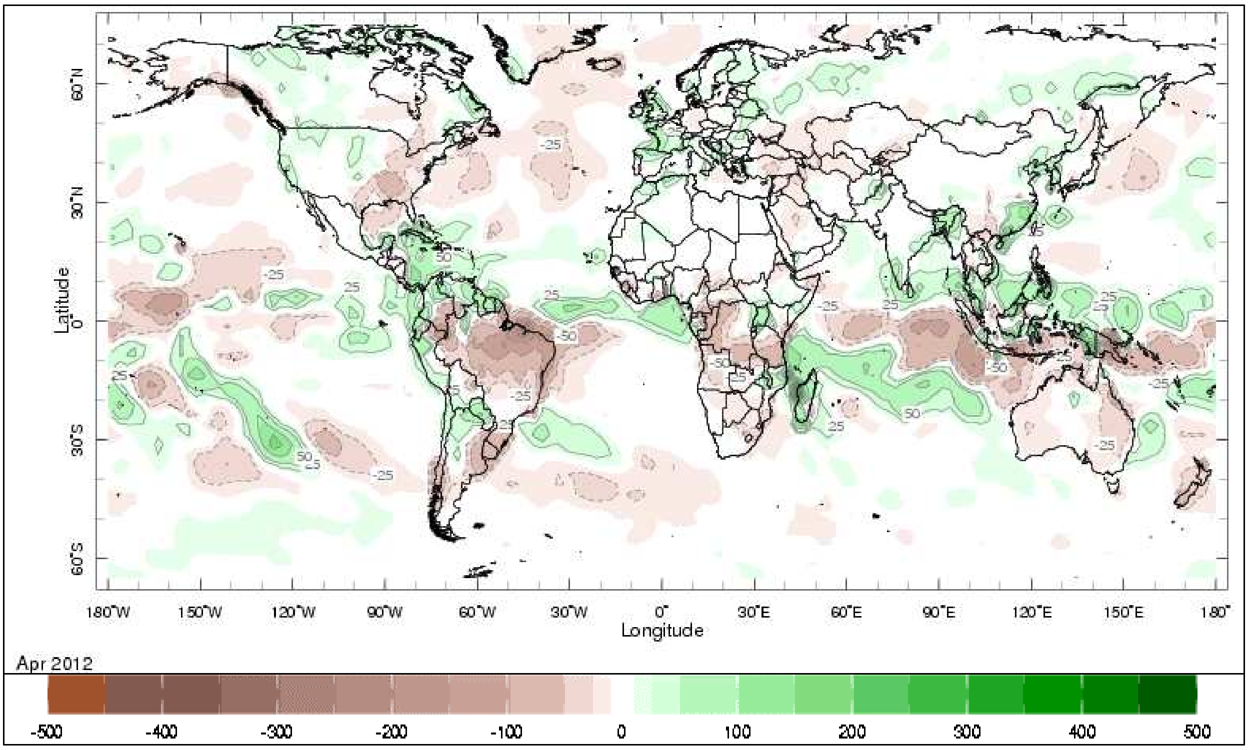


fig.9: Rainfall Anomalies (mm) in April 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Accordingly to the strong Divergent Circulation anomalies over the North Western part of South America one remarks strong positive rainfall anomalies over these regions. These anomalies extend eastward up to the Caribbean and westward over the eastern Pacific.
In the same way, there is positive anomalies over the western part of the equatorial Pacific which extend interestingly toward the South of India.
The negative anomalies, strong over the Nordeste Brasil, and weaker over most of Africa South to the equator are also well related to the divergent circulation anomalies.
In Europe, the positive anomalies are related to the Geopotential anomalies already discussed above.

I.2.cTemperature

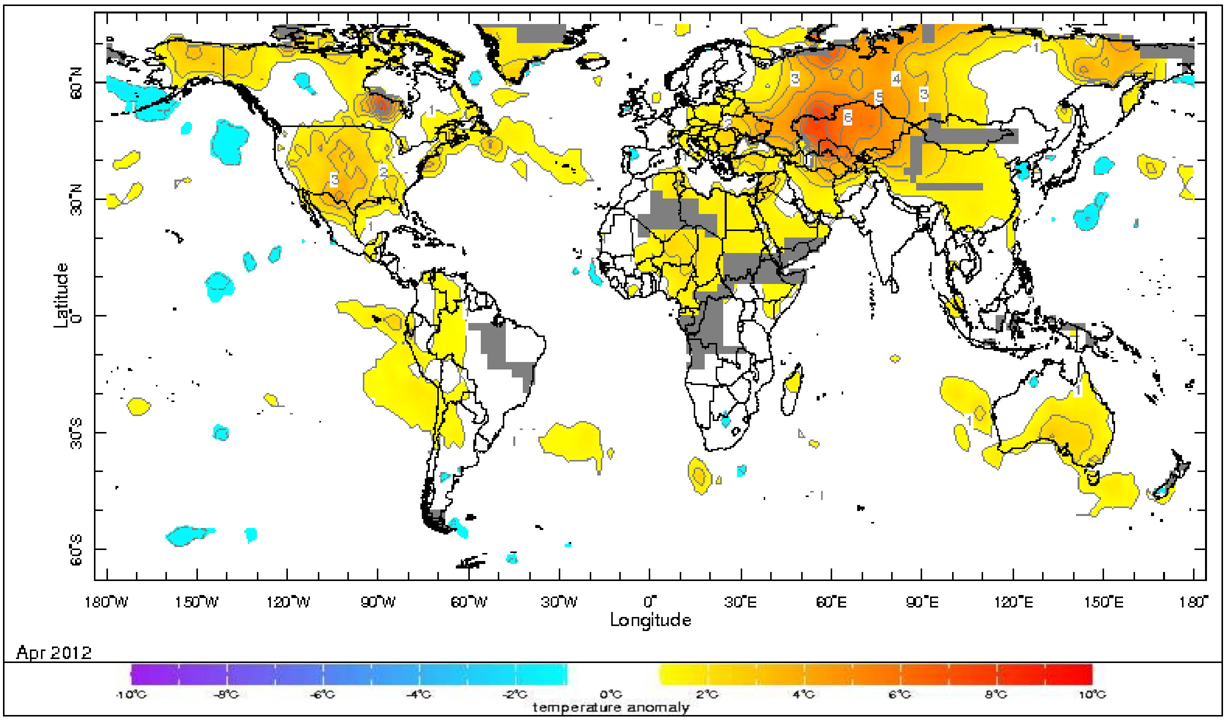


fig.10: Temperature Anomalies (°C) in April 2012 (departure to the 1979-2000 normal) **http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html**

For temperatures (fig. 10) it is remarkable that the anomalies are positive (more or less) everywhere. The strongest anomalies are still in the Northern hemisphere ; especially over Ukraine and adjacent regions. However, mots of the Asian and North American continents face above normal conditions. The close to normal conditions over the western façade of Europe are related to the rainfall anomaly over these regions. In the Southern hemisphere the anomalies are less large likely in relationship the Geopotential field which shows only little anomalies.

I.2.d Sea Ice

In Arctic, the sea-ice extension anomaly (fig.9) is progressively reaching the normal values. However one can remark some regional modulation North to Norway (deficit) and on the Pacific side (excess).
In Antarctic, the sea-ice extension anomaly (fig. 9bis – right) is close to normal with some regional modulation.

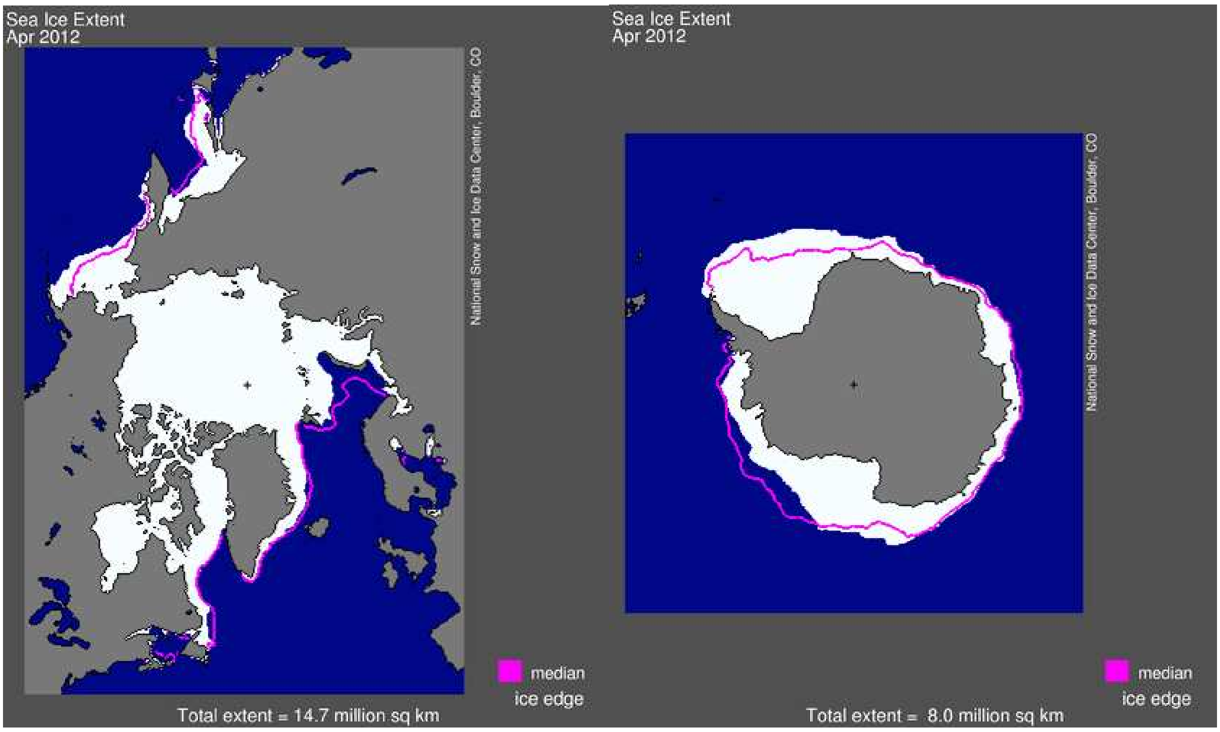


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in April 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

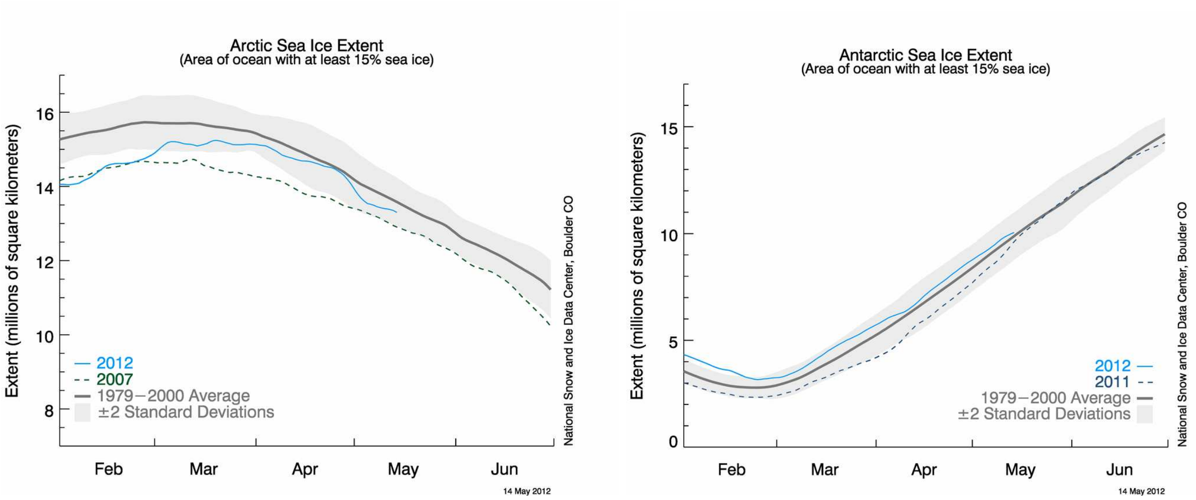


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR JJA FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

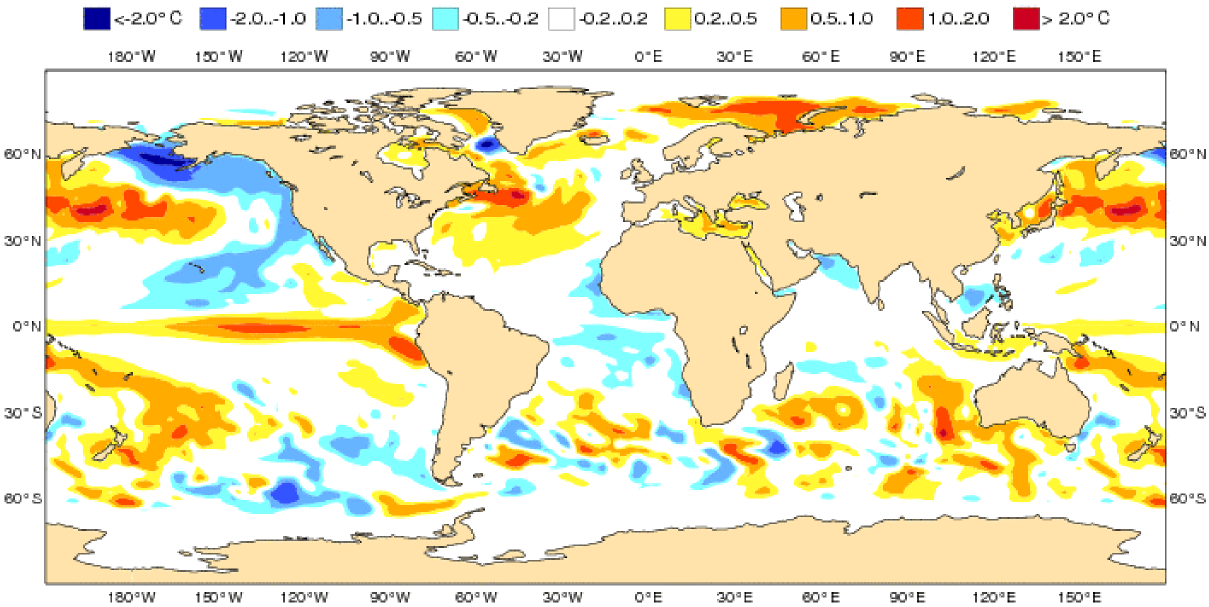


fig.12: SST anomaly forecast (in °C) from ECMWF for June-July-August, issued in May.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

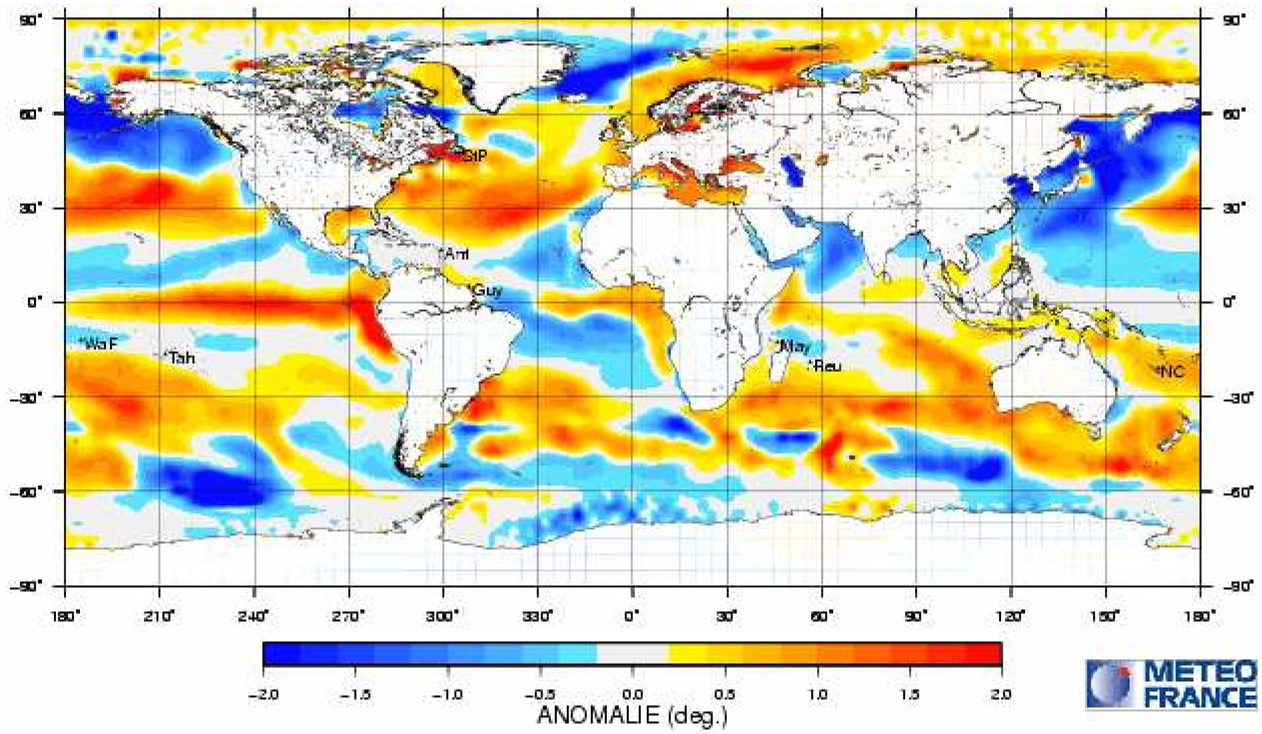


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France June-July-August, issued in May. **http://elaboration.seasonal.meteo.fr/**

The 2 models are very consistent over most of the Equatorial Pacific. Both models are developing a coastal event in the eastern Equatorial Pacific ; event which strengthen and propagate westward along the 7 month range of the forecast. The main difference is related to the westward expansion of the positive anomaly in the equatorial waveguide. This leads to some large regional differences in the forecast of temperature and rainfall. This difference can be related to model uncertainty especially in relationship with ITCZ and SPCZ representation.
Then there is large differences over the North Western Pacific.
Over the Atlantic in the Southern hemisphere the proposed scenarios are similar. For the equatorial and North Tropical Atlantic, there is some differences, especially in the Guinean Gulf where Meteo-France is likely penalized by its warm bias in this region. In ECMWF, there is a negative anomaly but with a wlear weakness over the equator. Both models are forecasting cold SSTs in the Southern Hemisphere and also cold SSTs on the Eastern part on the North Tropical Atlantic, close to the western coast of West Africa. This pattern will influence the behaviour of the West African Monsoon, especially in term of large scale circulation (related to the ITCZ behaviour over this region).
In Euro-SIP forecast, in the Pacific the patterns are quite similar to the one already discussed just above. The warm coastal event is clearly visible.
Over the South and eastern North Tropical Atlantic the likely scenario correspondsto colder than normal conditions. The weak positive anomaly in the Guinean gulf can be likely related to the Meteo-France positive bias over this region. However, Euro-SIP is forecasting such conditions all over the equatorial waveguide.
Last, in the Indian Ocean, one can see close to normal conditions over most of the Tropics and warmer than normal conditions over the Southern part of the basin ; especially in regions close to Australia. However, the North-Western part of the basin should face Below Normal conditions.

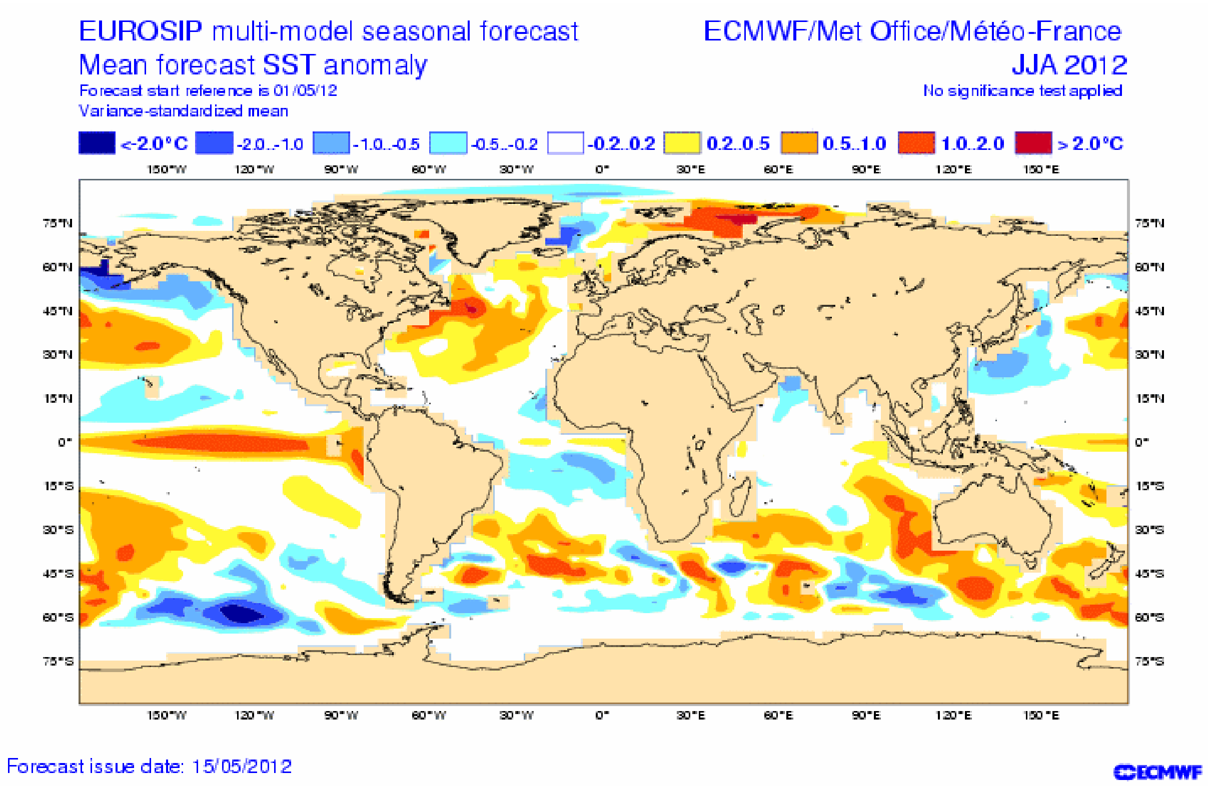


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for June-July-August, issued in May.

II.1.b ENSO Forecast :

Forecasted Phase for MJJ : Close to Neutral conditions (possibly evolving to El Niño condition later on)

IRI provide a synthesis of several model forecast for the Niño 3.4 box (see definition in Annex) including models from Euro-Sip and statistical models. The figure 15 shows the ensemble mean of these models (circle for statistical models and squares for dynamical coupled models). The yellow thick line indicate the average of all dynamical models.

For June-July-August on average, most of dynamical models forecast conditions above the normal but still below an El Niño threshold. Then, most of the models forecast the continuation of the warming along summer or fall period. For the statistical models, they are forecasting close to neutral conditions, which seems to be not surprising as in term of historical data such an evolution is quite rare. However, the question of the development of an El Niño event for the end of this year becomes really relevant.

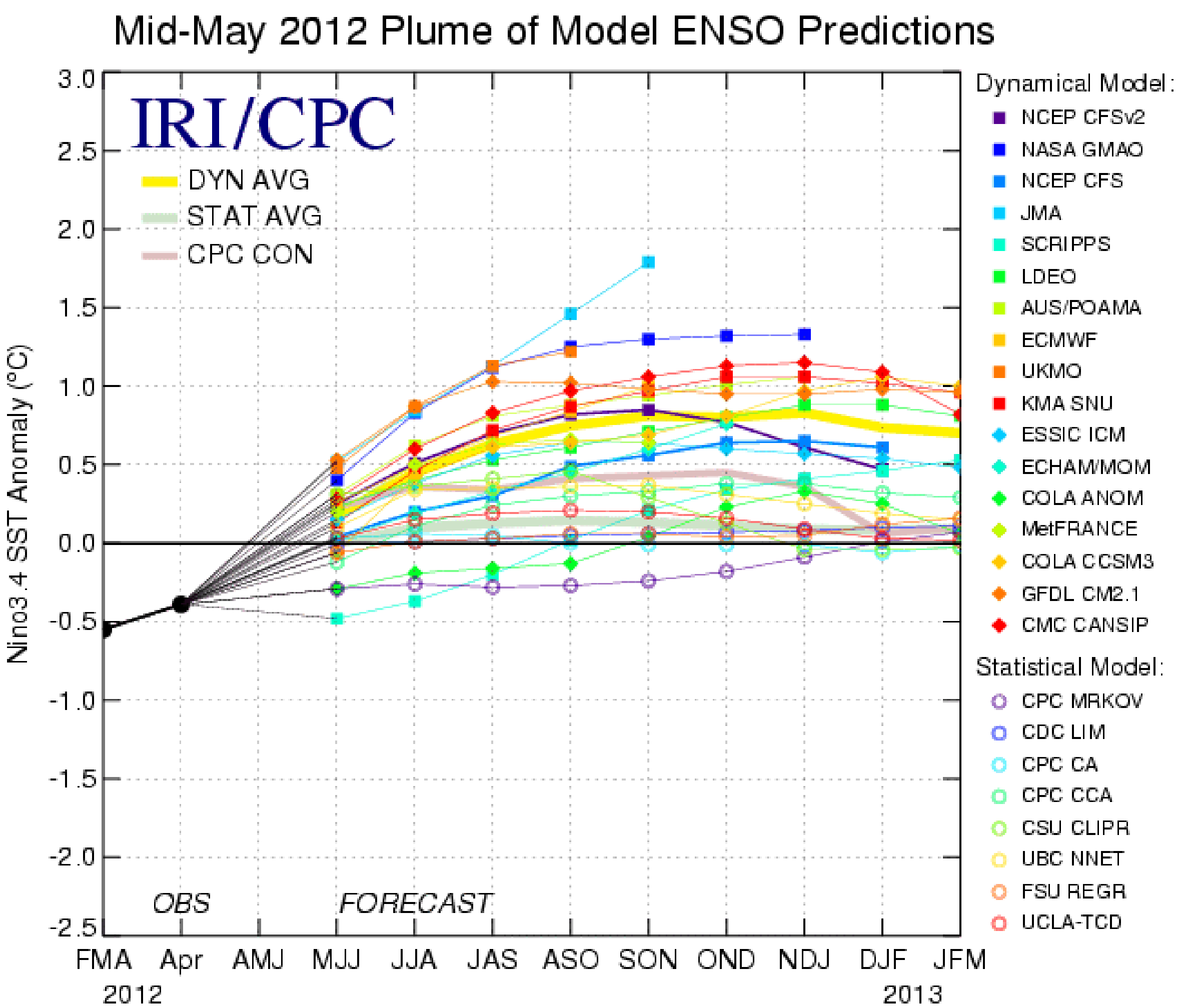


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in April by IRI : http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

The following table (from IRI) give the SST values currently used to decide the nature of forecasted event for the Niño3.4 box (« El Niño », « La Niña » or « Neutral » : these values depend on the season and a situation is considered as « Neutral » if the forecast is within theses critical values. The 3 last lines give the 3-month mean of the different categories of models. *This clearly reflect the "Neutral" condition which prevails for MJJ.*

SEASON	MJJ	JJA	JAS	ASO	SON	OND	NDJ	DJF	JFM
Value « La Niña » **Value « El Niño »**	***-0,50*** ***0,45***	***-0,50*** ***0,45***	***-0,50*** ***0,45***	***-0,55*** ***0,50***	***-0,75*** ***0,70***	***-0,75*** ***0,75***	***-0,70*** ***0,70***	***-0,65*** ***0,65***	***-0,55*** ***0,50***
Average, statistical models	*-0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Average, dynamical models	*0.2*	*0.4*	*0.6*	*0.7*	*0.8*	*0.8*	*0.8*		
Average, all models	**0.1**	**0.3**	**0.5**	**0.6**	**0.6**	**0.5**	**0.5**	**0.4**	**0.4**

The figure 16 shows plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex). Both models forecast a warming up to normal conditions at the end of spring and they forecast a continuation of this warming along the 7 months of the forecast to reach the Niño threshold (a bit earlier in MF). The spread of the forecasts is normal (for such a forecast) in Météo-France and becomes very large in ECMWF. In both models, one can notice that the Niño 3 index can reach the highest values consistently with the development of a coastal event (however, it is the box where the spread is the larger).

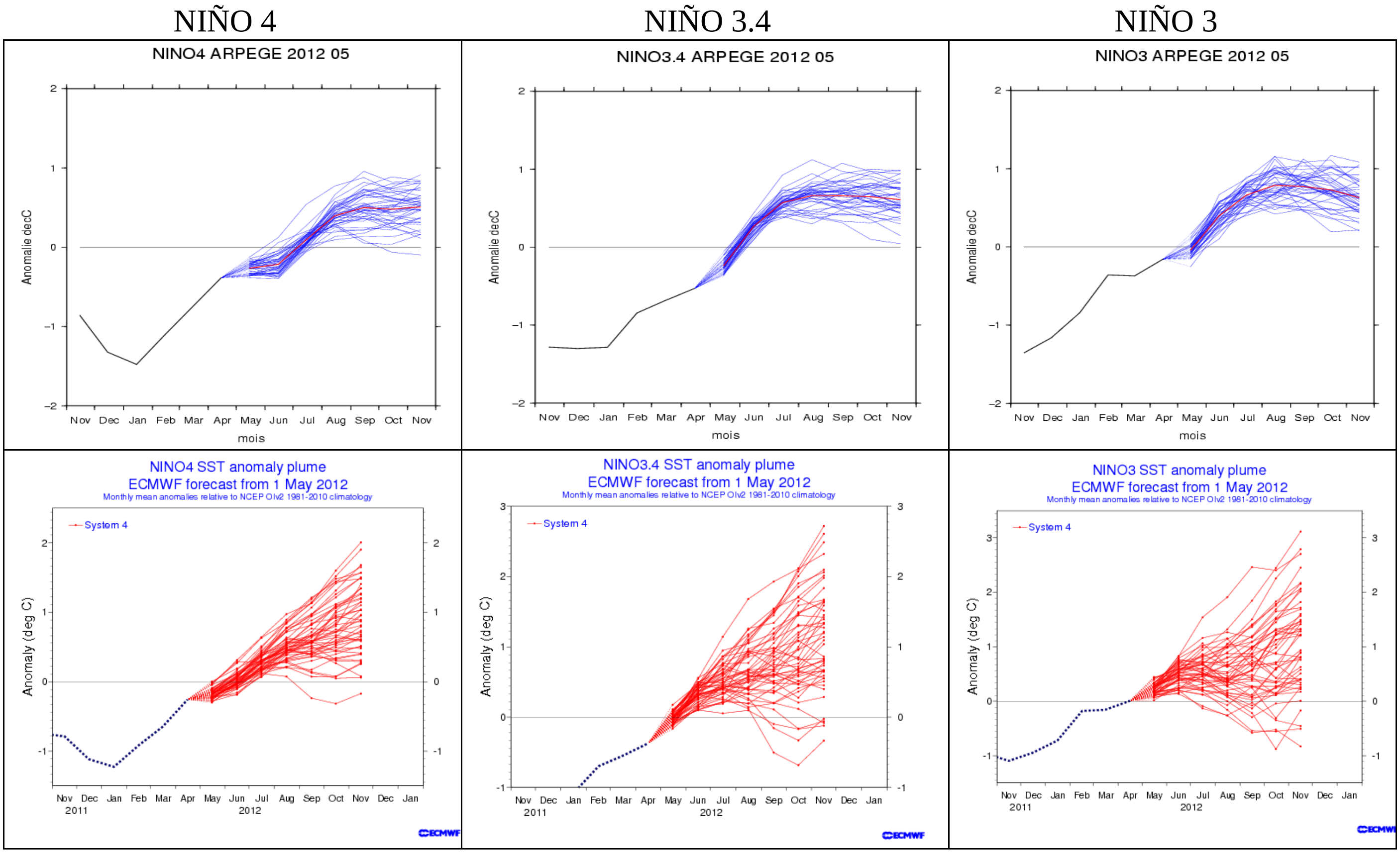


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in May, monthly mean for individual membres. (http://www.ecmwf.int/ **)**

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: ***Cold then warming in the North/South Tropical parts***

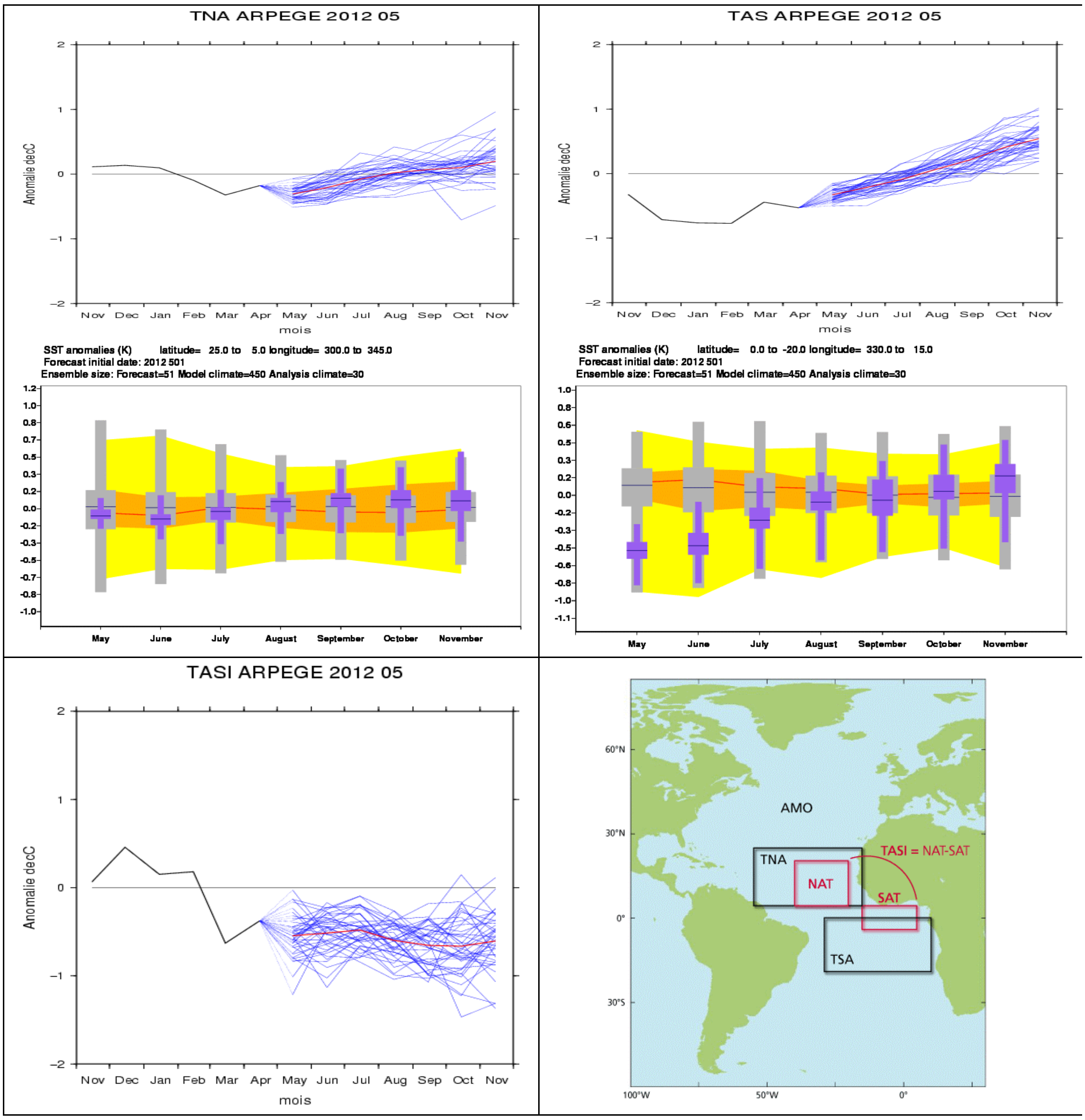


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in May, plumes and climagrams correspond to 41 members and monthly means.

In both models, the Plumes or climagrams show the same time tendency : they indicate cold conditions at the beginning and then continuous warming in both Northern and Southern Tropical parts which lead to close to normal conditions at the end of the period for the Southern box and since August for the Northern box. Because of the warm bias in MF, the TASI index is negative. However, looking to ECMWF forecasts, one can remark that the Tropical Southern part of the basin is colder than the Tropical Northern part ; this should favour some South-North inter-hemispheric gradient (which is important in the West African monsoon perspective).

II.1.d Indian Ocean forecasts :

Forecasted Phase: ***Close to normal then warming in the West/East equatorial part***

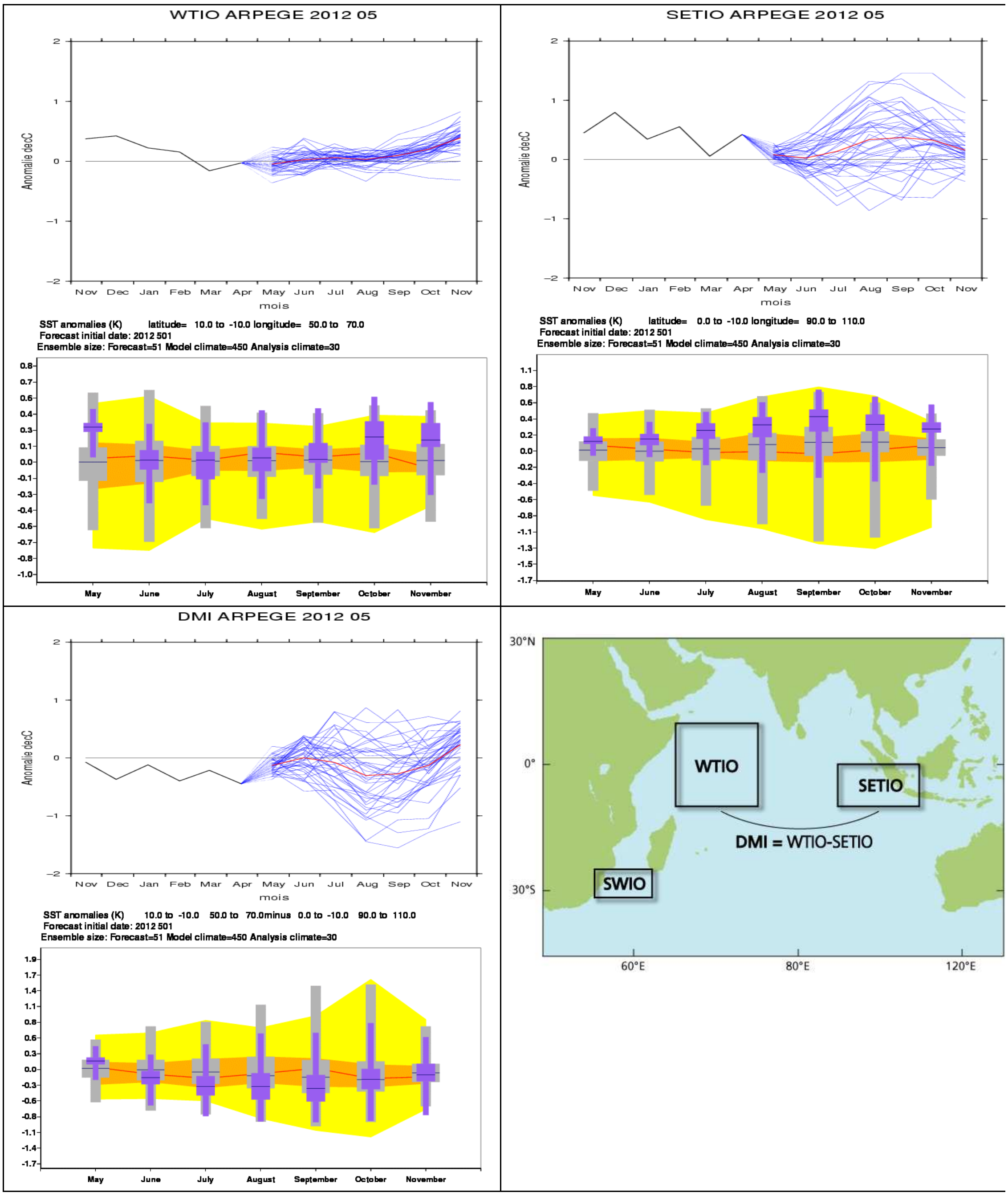


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in May, plumes and climagrams correspond to 41 members and monthly means.

In both models, the Plumes or climagrams show some similarity : they indicate close to normal conditions and at the end a warming in the Western part of the basin while, in Eastern Equatorial Indian Ocean, they show above normal conditions, especially during summer and fall. Consequently, the DMI is mostly negative in both models with some temporal evolution differences (with a large spread in MF and less spread in ECMWF).

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

As a first glance, the velocity potential anomaly field (cf. fig. 19) show in the Tropics a 1 wave number pattern in both models (ECMWF and Meteo-France). However, the ECMWF pattern is eastward shifted by 40-50° of longitude. This leads to dramatic changes in the Hadley-Walker circulation anomalies in the 2 models.
In more detail, over the Western Pacific ECMWF shows a strong atmospheric response with a divergence anomaly (upward motion) while it is located over South-East Asia in MF. Nevertheless, ECMWF show a weak response in term of Stream function anomaly while MF shows more activity but mostly trapped within the Tropics.
Over the Atlantic, both models indicate a convergent circulation anomaly (downward motion) located over the equator and West Africa in ECMWF and close to the North-Eastern coast of South-America in MF. Again, the ECMWF response in term of Stream Function is very weak while we have some indication of meridionnal propagation in MF especially over Mediterranean regions. However and looking to model uncertainties, it seems difficult to interpret the MF response in term of predictability over these regions. In conclusion for Europe, it is difficult to assess a clear indication of tropical forced teleconnection excepted may be for the Mediterranean regions.
Last over the Indian ocean and Indian sub-continent, the 2 models are showing large differences in terms of Velocity Potential anomalies. In MF a large negative anomaly is visible over South-East Asia and also over Africa (North to the equator) while the signal is very weak over India and Africa in ECMWF.
The reason of such a large difference is unclear but one can guess that the differences over the Pacific can influence a lot the Hadley-Walker circulations over the South-East Asia, India and Africa.
These differences could likely be related to model uncertainty and especially to differences in the sensitivity to oceanic forcing.

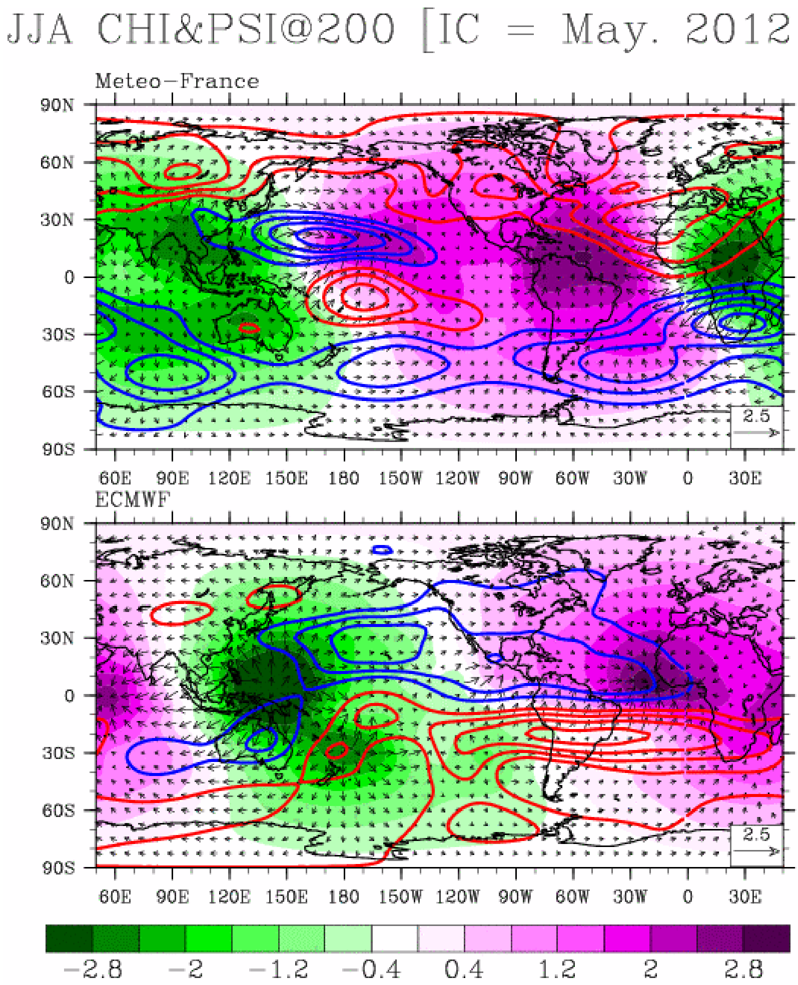


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for June-July-August, issued in May by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

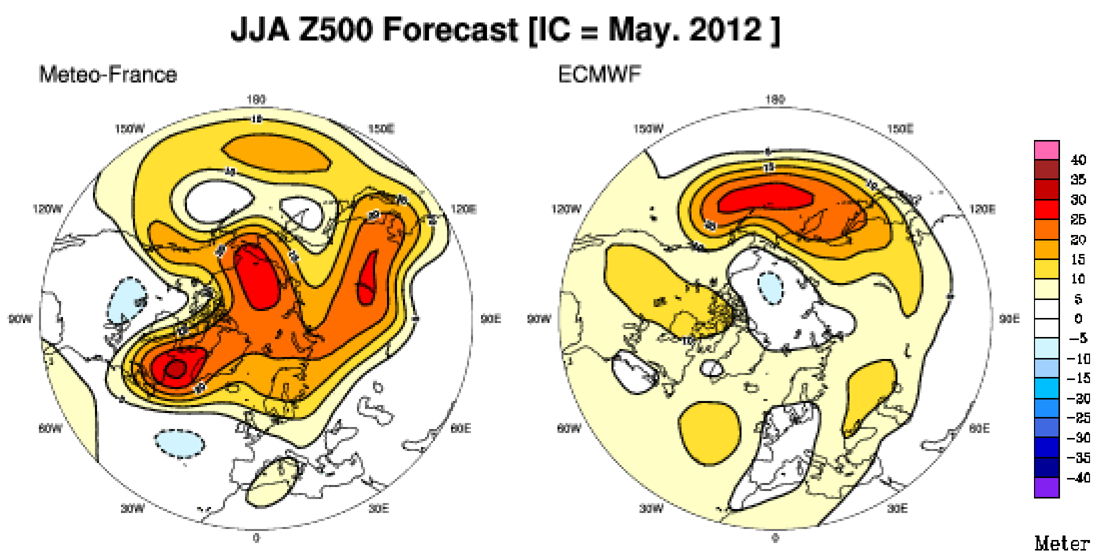


fig.20: Anomalies of Geopotential Height at 500 hPa for June-July-August, issued in May from Météo-France (left) and ECMWF (right).

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

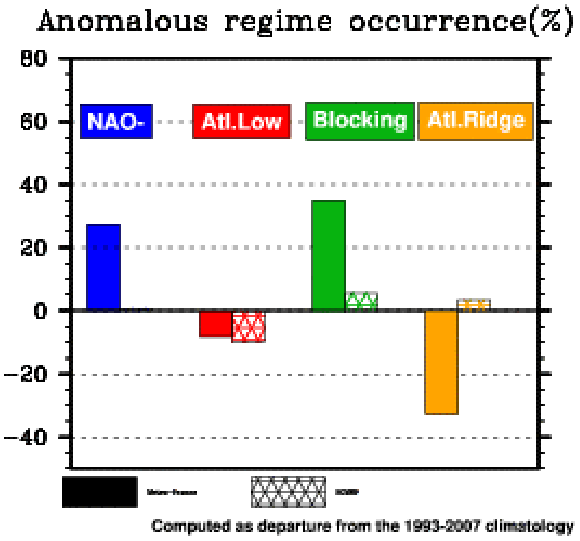


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Consistently with the stream function field, ECMWF model shows a few Geopotential Height anomaly at 500hPa (fig. 20) ; they are weak but positive over Europe. In MF there is stronger anomalies which are partly related to the climate trend and could be interpreted as partly tropically forced for the Mediterranean regions. So, not surprisingly, this infers, in the occurrence frequency, large differences in the two models ; namely no significant signal in ECMWF and an increase of Blocking regimes (partly related to Climate Trend) and NAO - and a decrease of Atlantic Ridge in MF model.
The General atmospheric circulation in MF and in the low troposphere (see figure 22) is a bit complex. The meridionnal wind anomaly has an enhanced Northward component. One can note that the zonal circulation is also weakened excepted in the South Western part of the Atlantic which is consistent with increased NAO- regime frequency.

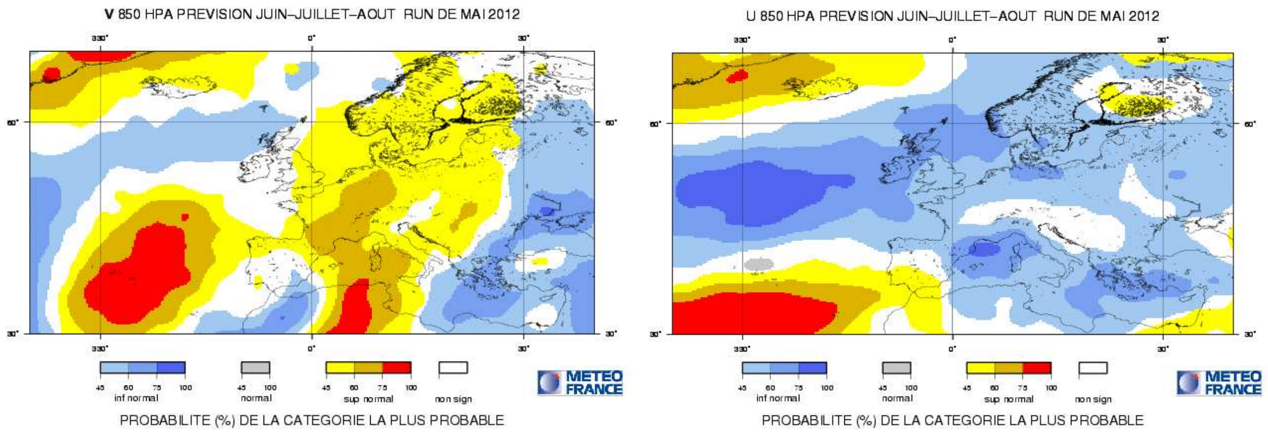


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for June-July-August, issued in May from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

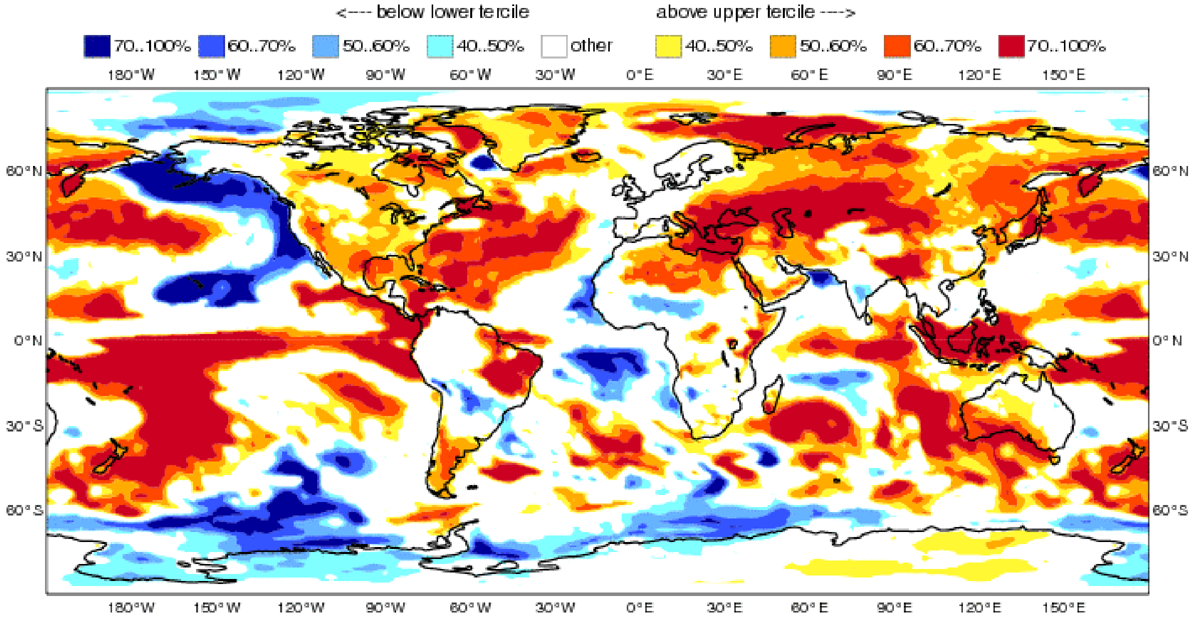


fig.23: **Most likely category probability of T2m from ECMWF for June-July-August, issued in May. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).** **http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/**

II.3.b Météo-France

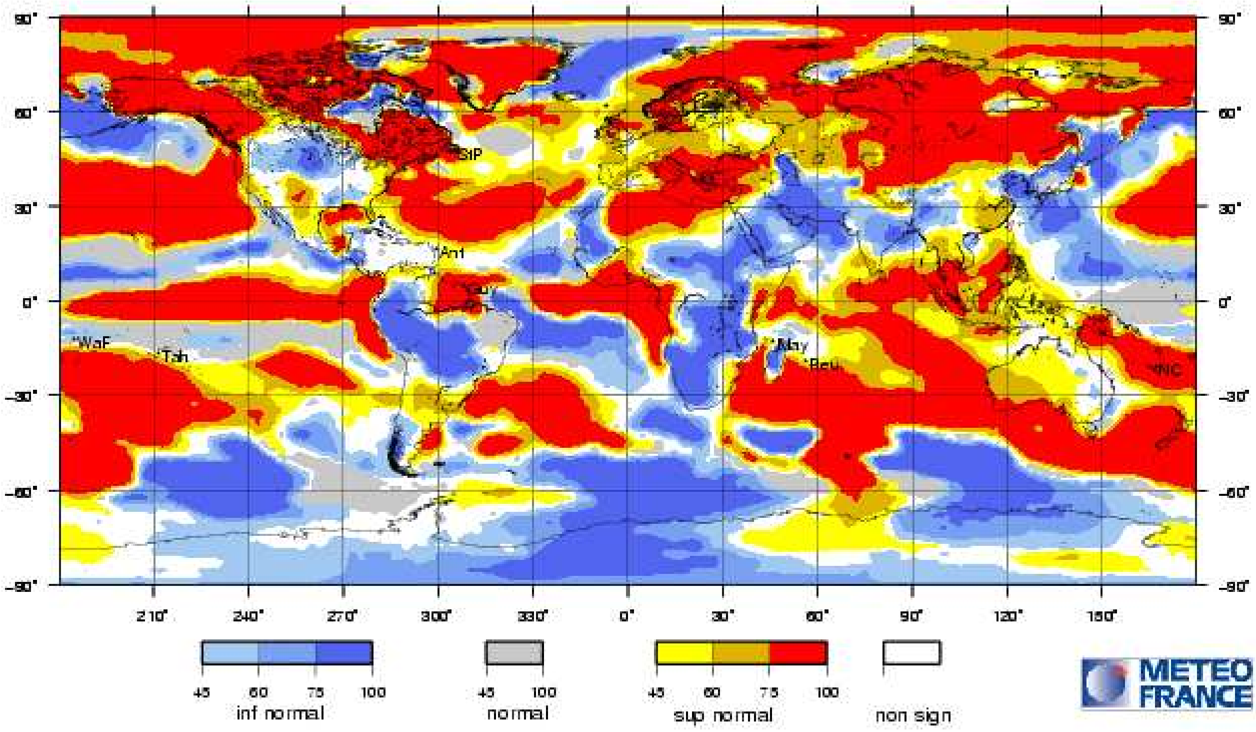


fig.24: **Most likely category of T2m for June-July-August, issued in May. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.** **http://elaboration.seasonal.meteo.fr/**

II.3.c Met Office (UKMO)

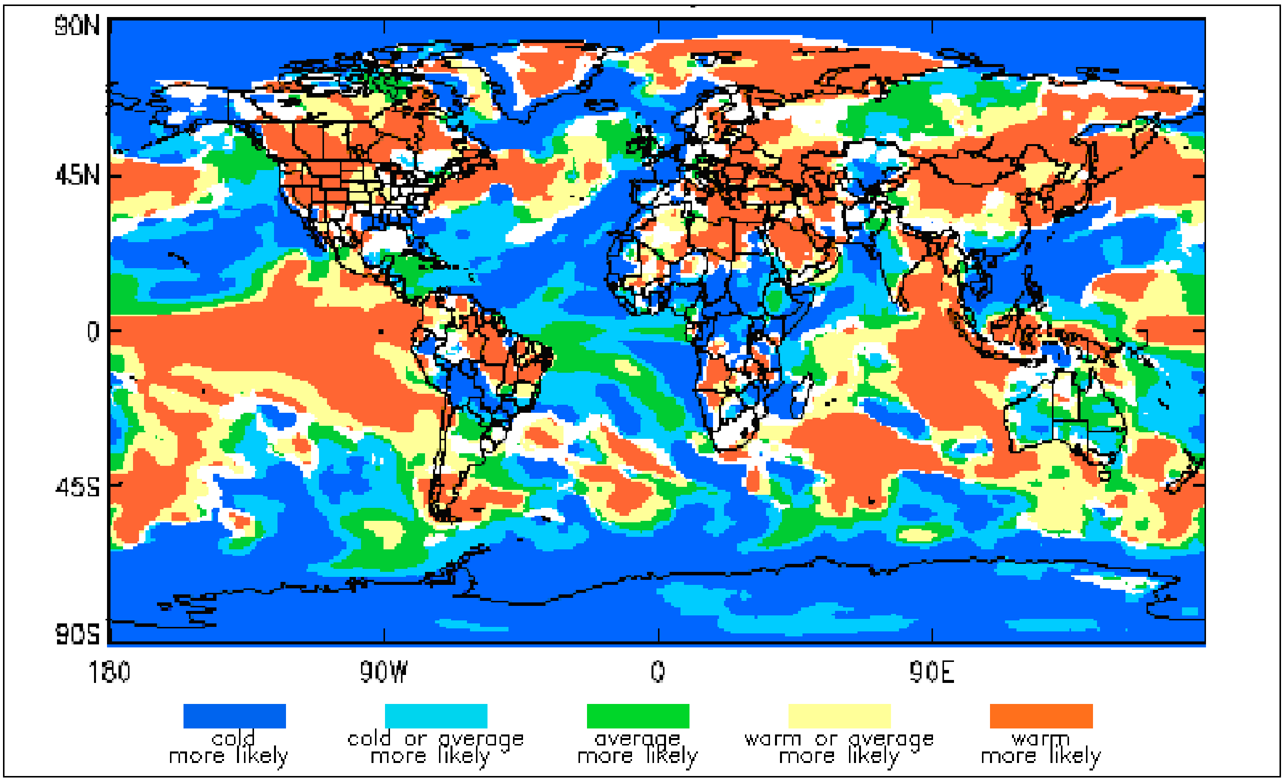


fig.25: Most likely category of T2m for June-July-August, issued in May from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

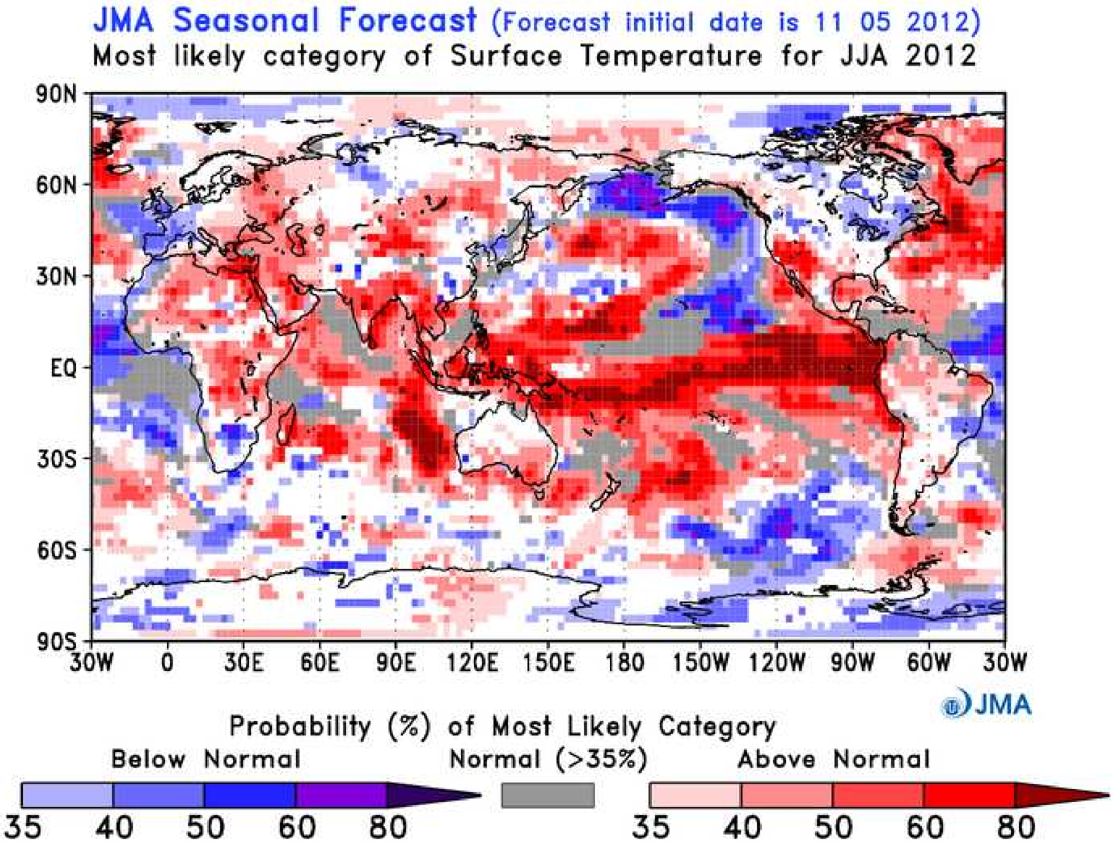


fig.26: Most likely category of T2m for June-July-August, issued in May from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

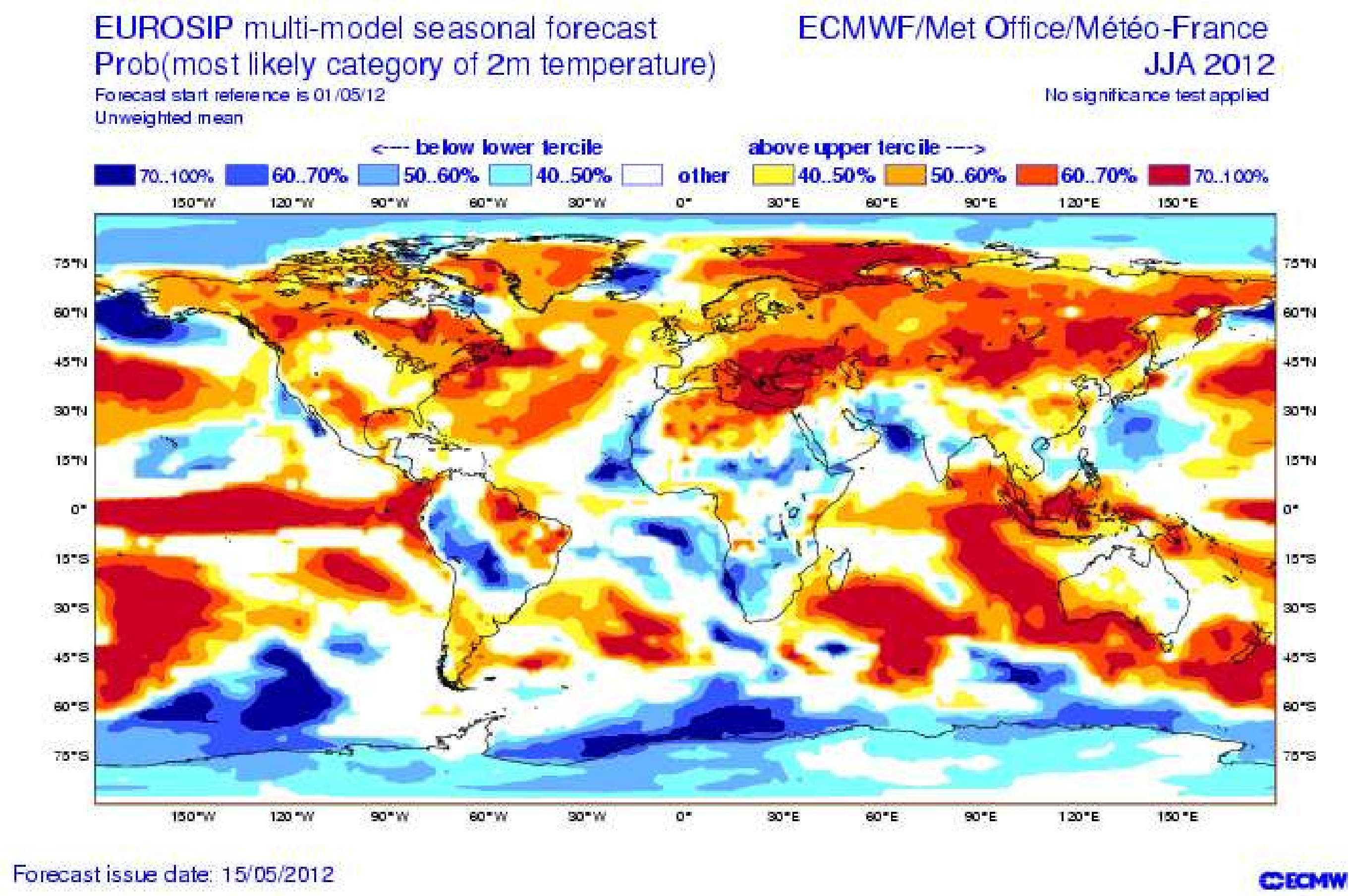


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for June-July-August, issued in May. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Most of the continent in the Northern Hemisphere face Above Normal situations. The signal is very consistent in all Euro-SIP individual models. As discussed in the previous section part of the signal is likely related to the Climate Trend. More uncertainty exists for the most western part of the European continent. To be notice that on a statistical point of view, the occurrence of an El Niño tends to favour above normal temperature end of spring and beginning of summer in different regions of the RA VI. So consequently, the Euro-Sip forecast makes sense and most of Europe should face Above Normal conditions.

Over Central and Eastern Sahelian regions, the Below Normal conditions are likely related to rainfall while along the western coast of West Africa is it likely related to SST conditions.

II.3.f International Research Institute (IRI)

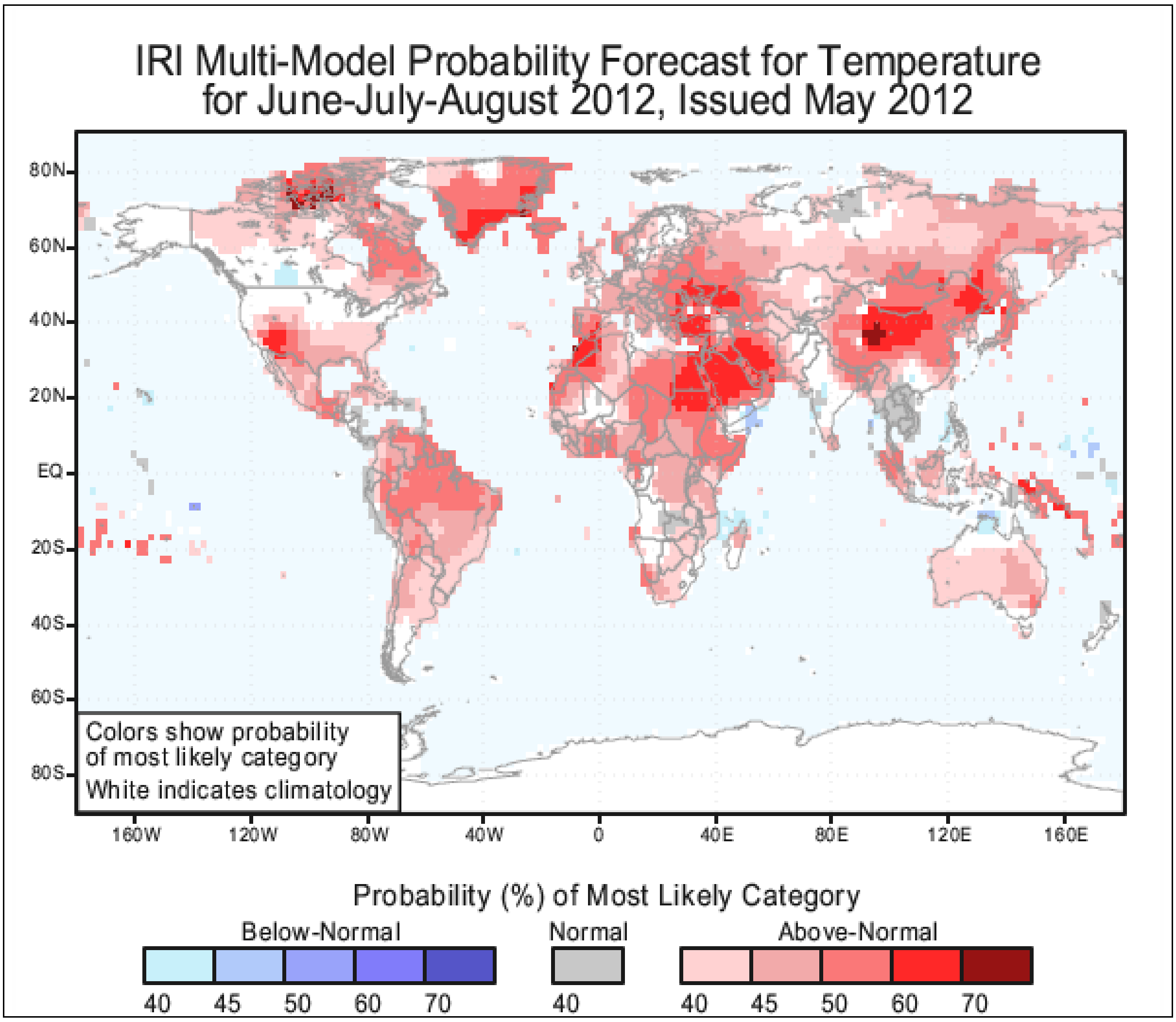


fig.28: Most likely category of T2m for June-July-August, issued in May from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

One can notice a large consensus with the Euro-Sip forecast for the Northern hemisphere (excepted on a northern portion of North America,). Some large differences exist over Africa and South America. For Europe, the tendency given by Euro-SIP (Above Normal Scenario) is confirmed.
Over Africa as there is No Signal for rainfall (see next section), the T2m forecast is very different from the one from Euro-SIP.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

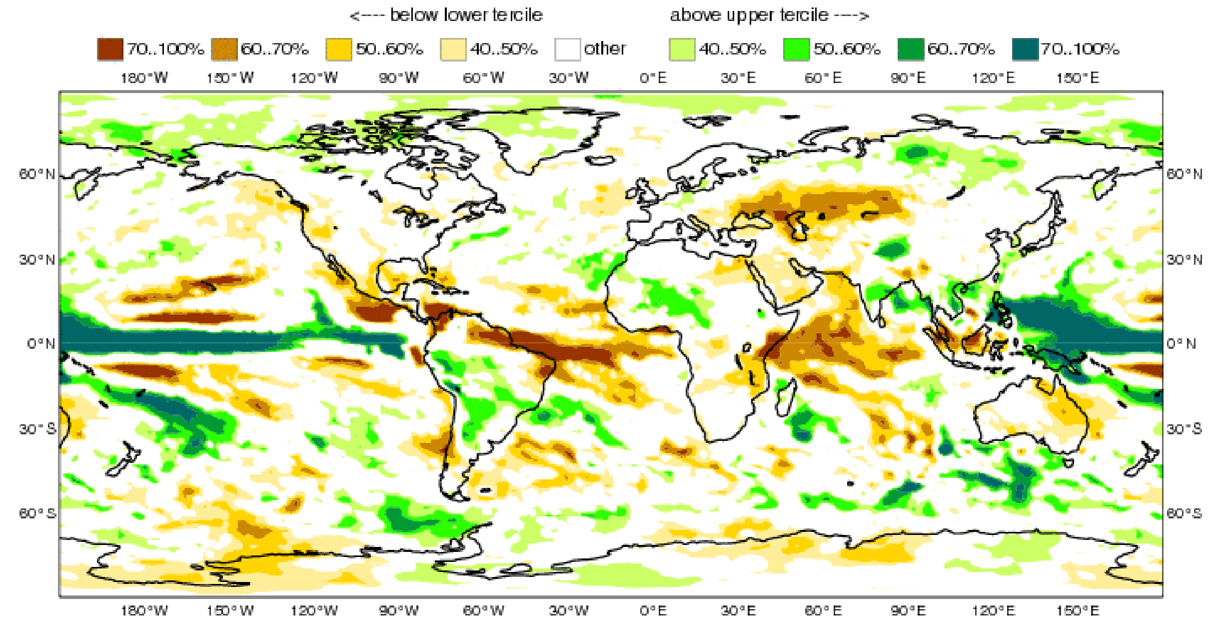


fig.29: Most likely category probability of rainfall from ECMWF June-July-August, issued in May. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

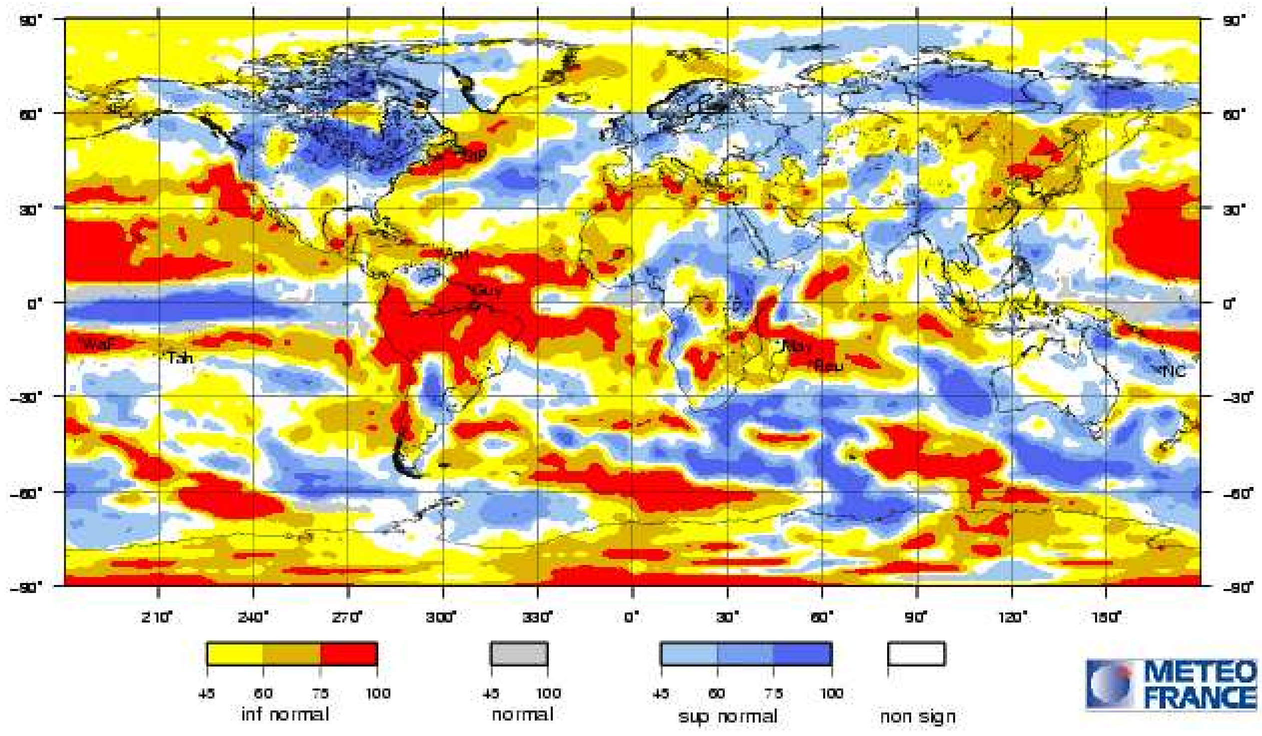


fig.30: Most likely category of Rainfall for June-July-August, issued in May. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

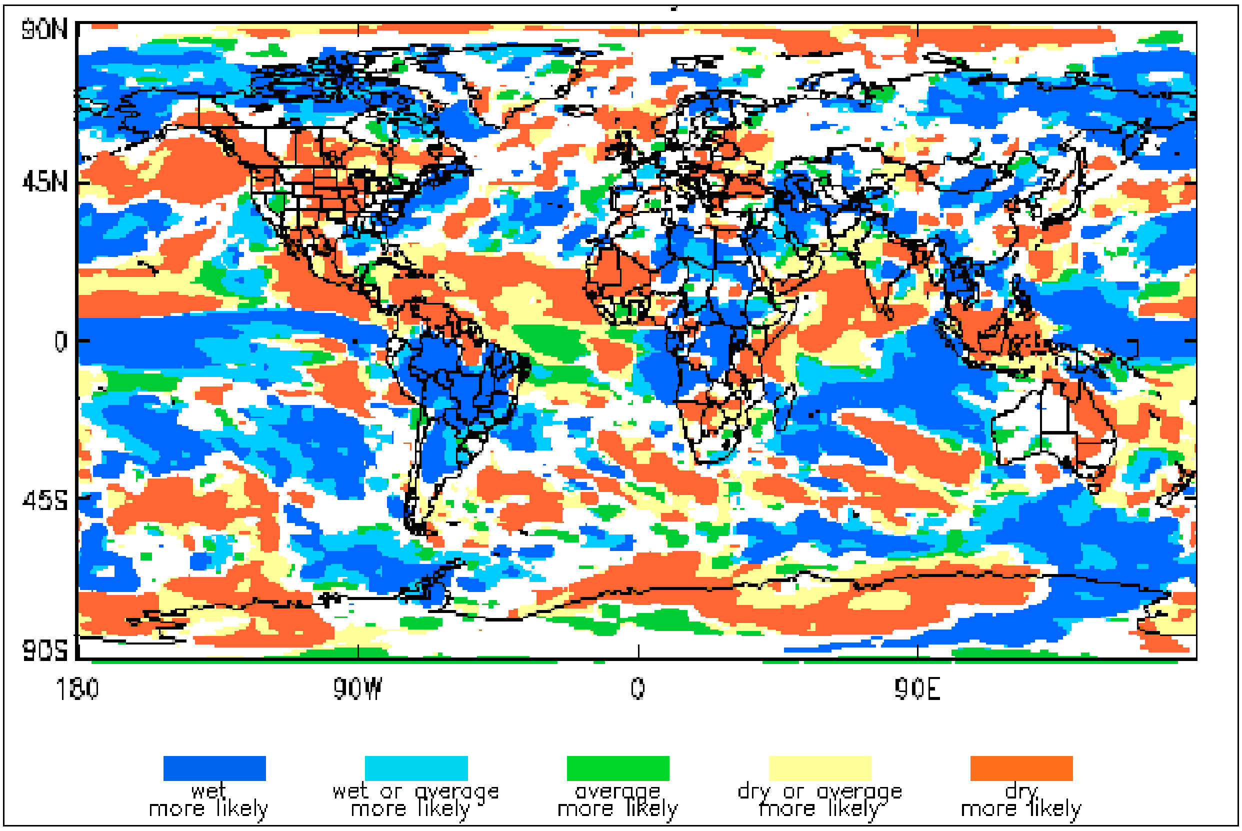


fig.31: Most likely category of Rainfall for June-July-August, issued in May from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

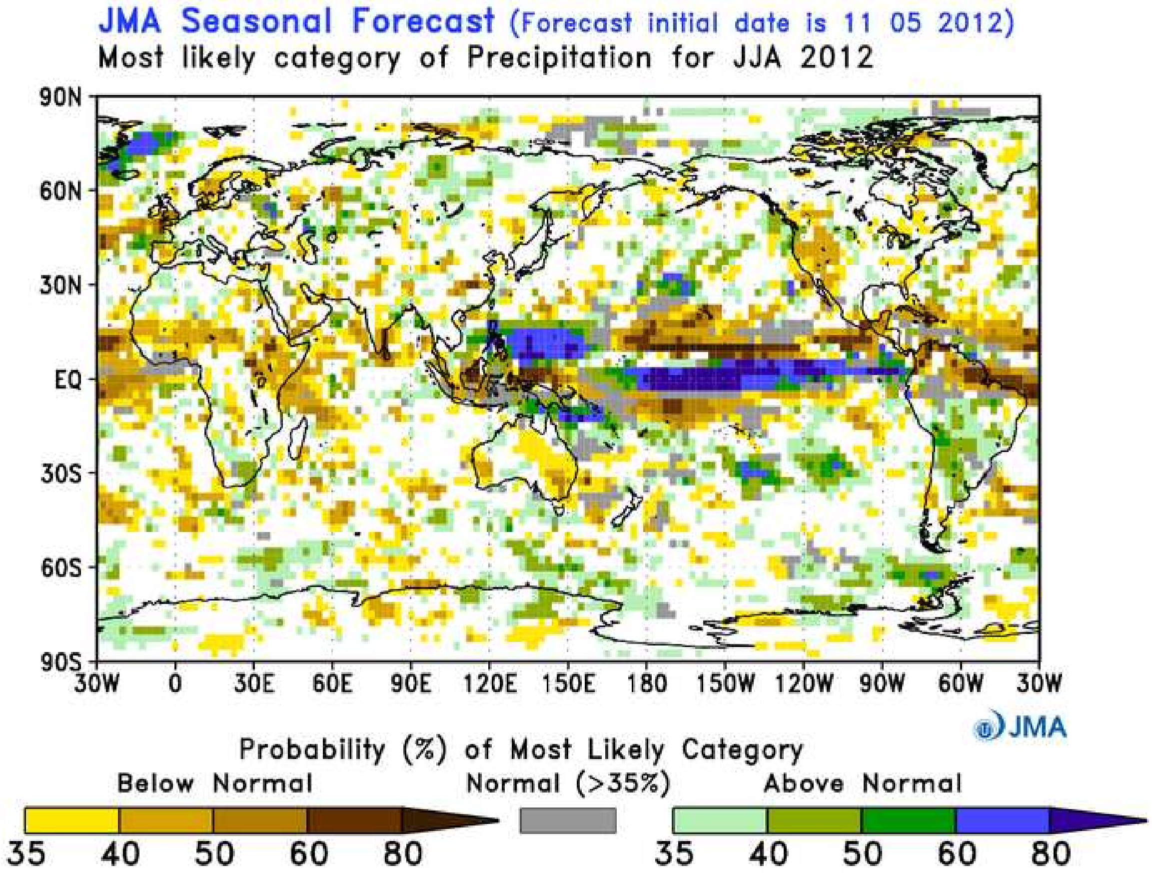


fig.32: Most likely category of Rainfall for June-July-August, issued in May from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

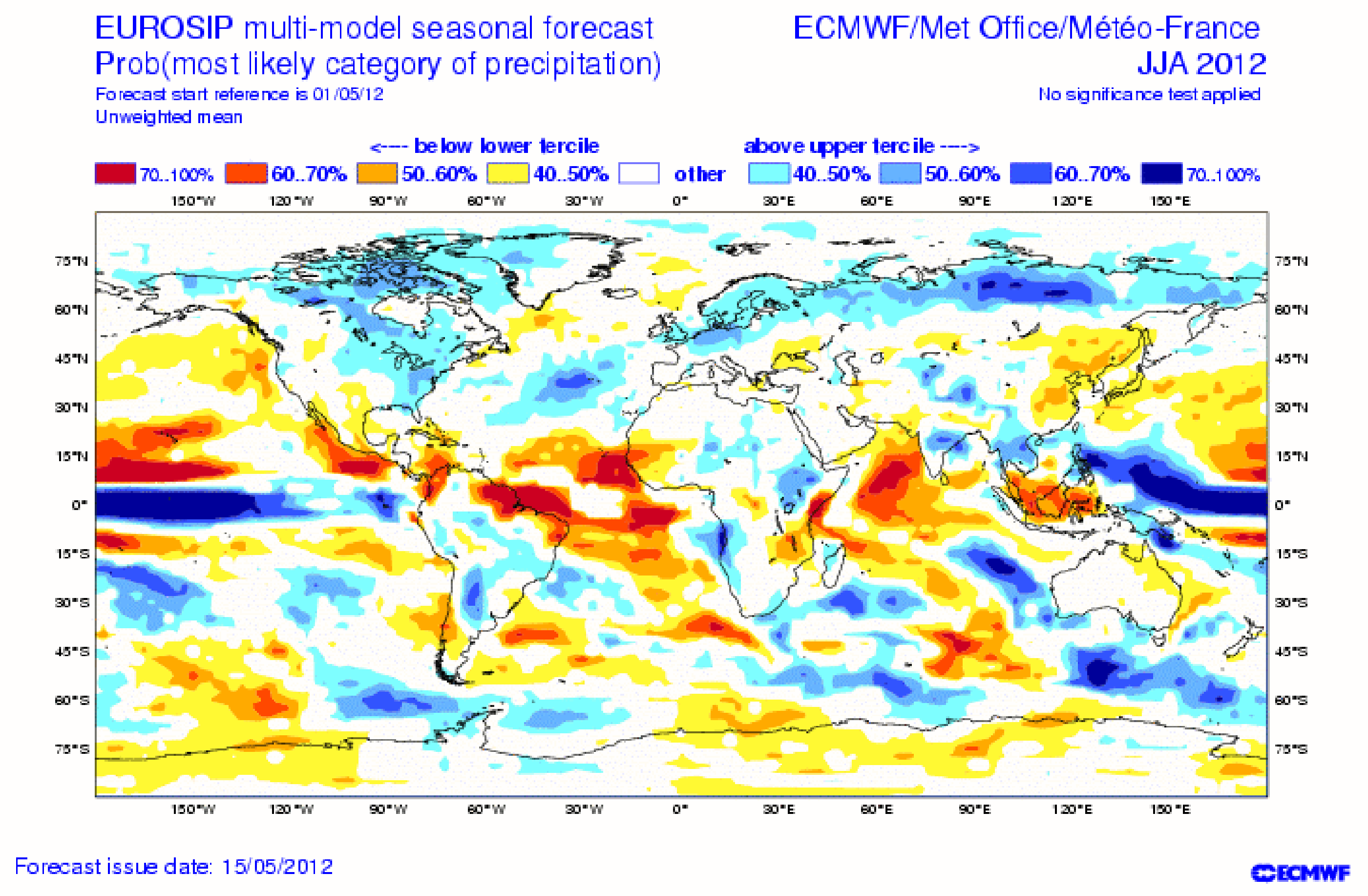


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip June-July-August, issued in May. (2 Categories, Below and Above normal – White zones correspond to No signal).

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Referring to Euro-SIP forecasts, there is some consistency over North-East Europe and Siberia, East Asia, Canada, North regions of South America and Nordeste Brazil, and regions close to South-East Asia including some part of India.

Over Eastern and Central Sahel there is some indication of enhanced probability for Above Normal conditions while Below normal conditions should prevail on the western part of West Africa (in relationship with cold SST development) and along the coast of the Guinean Gulf.

II.4.f International Research Institute (IRI)

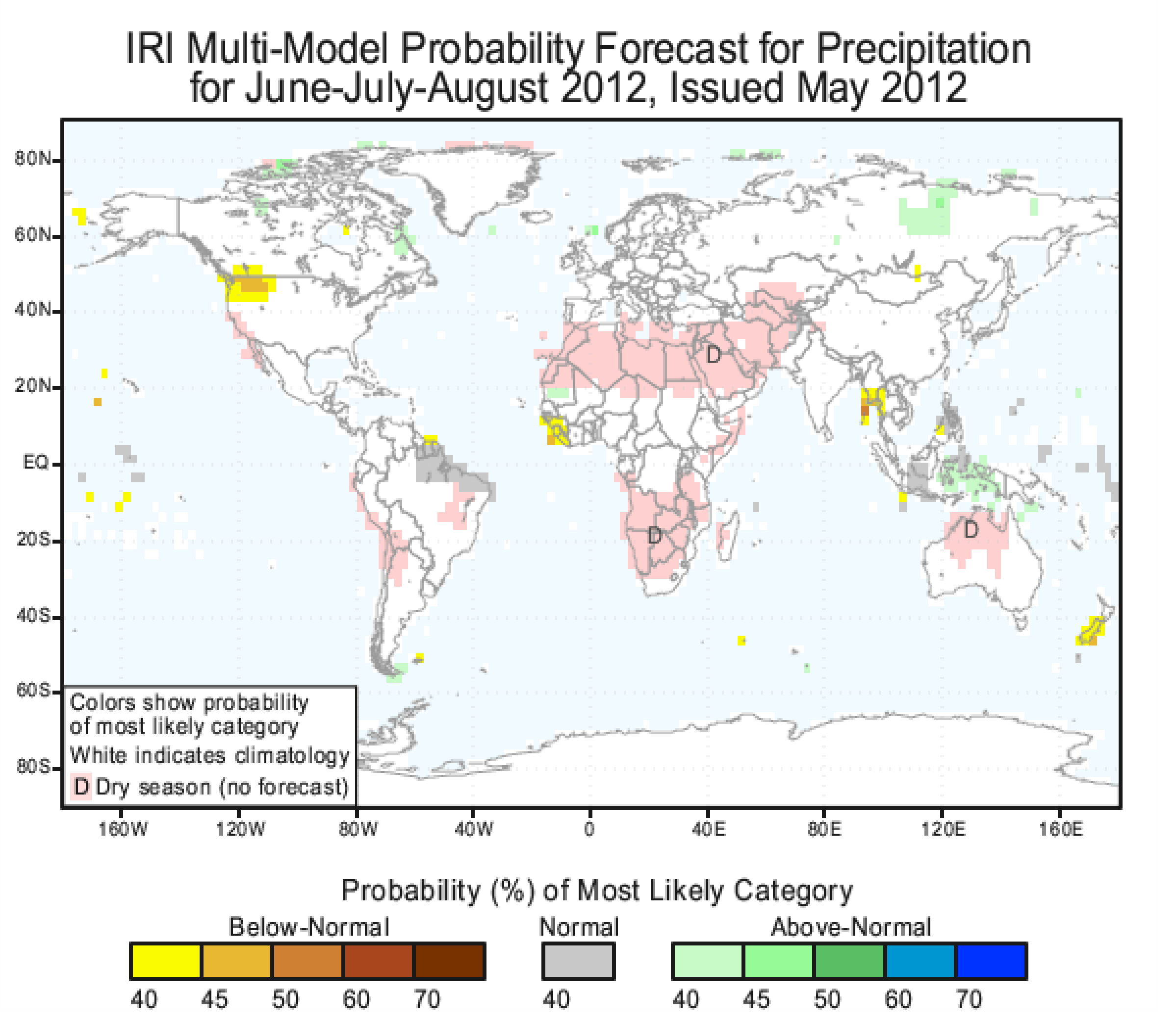


fig.34: Most likely category of Rainfall for June-July-August, issued in May from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows No Signal more or less everywhere. Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast).
Over West Africa, the only little consistency is over the most Western part of the continent with some tendency to dry conditions.

II.5. REGIONAL TEMPERATURES

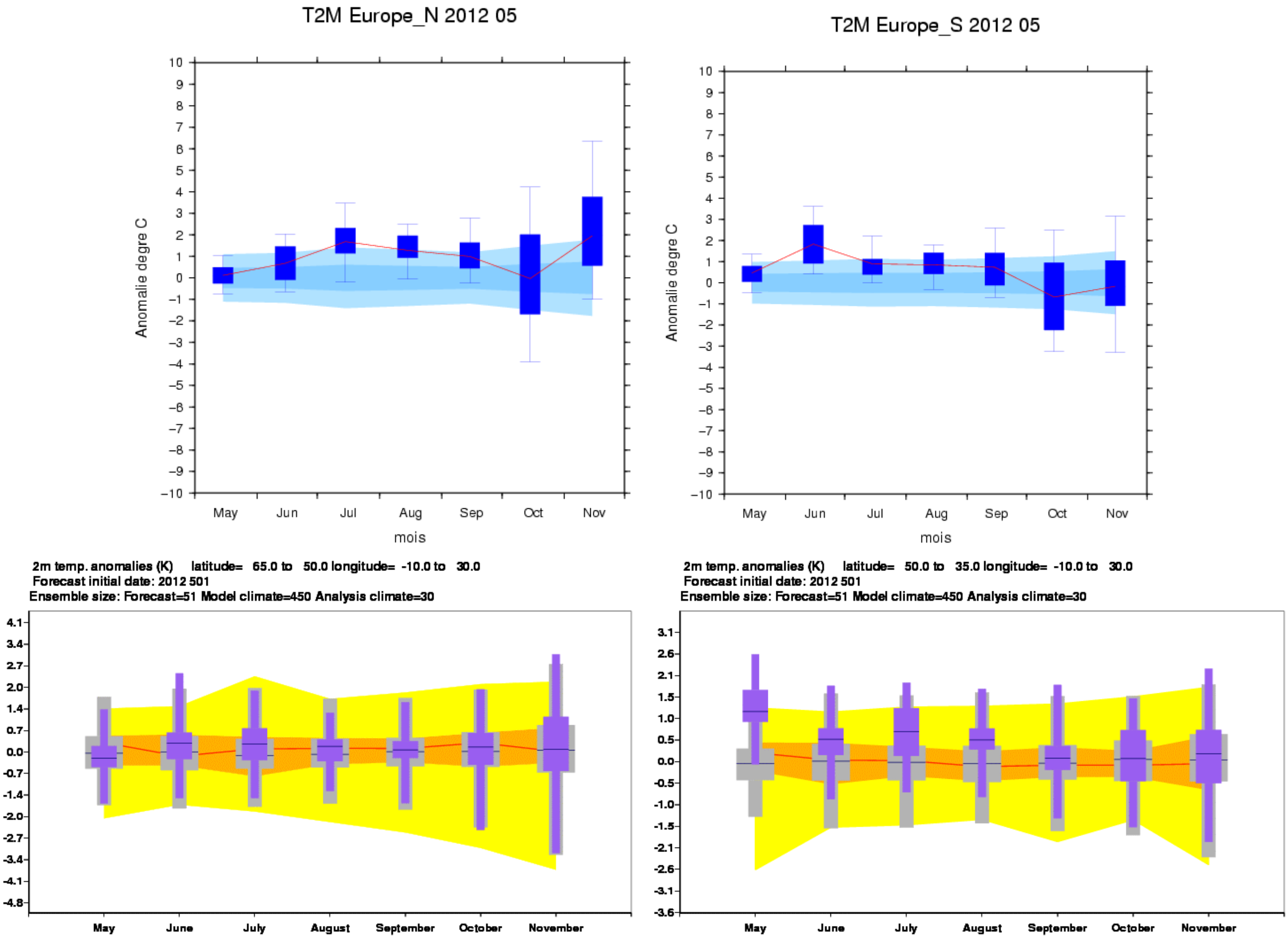


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in May.

For both Northern and Southern Europe, the 2 models show some consistency for Above normal conditions on the JJA period and beyond. This is particularly true for Southern Europe while for Northern Europe there is a large difference in August and beyond. For this later box, the differences between the two models can be related to the model uncertainties and to the climate trend representation which is clearly overestimated in MF (overestimation of blocking conditions - see fig. 20).

In Météo-France, for Northern Europe, there is some skill (close to 0.55) from May to July, then the score increase to reach around 0.6 in August and September. For Southern Europe the skill from May to August is better than 0.6 (it can reach even 0.7). Then in September and after it becomes close to climatology.

In Météo-France climagrams, the distributions of area averages are displayed for the seasonal forecast (dark blue boxes and wiskers), and the climate reference on the 29-year hindcast period (blue and light blue bands). The limits of the boxes (ensemble forecast) and blue band (climate reference) correspond to the upper and lower terciles. The limits of the wiskers (ensemble forecast) and light blue band (climate reference) correspond to the mean + 1 standard deviation and the mean – 1 standard deviation. The red line corresponds to the ensemble mean.

REGIONAL PRECIPITATIONS

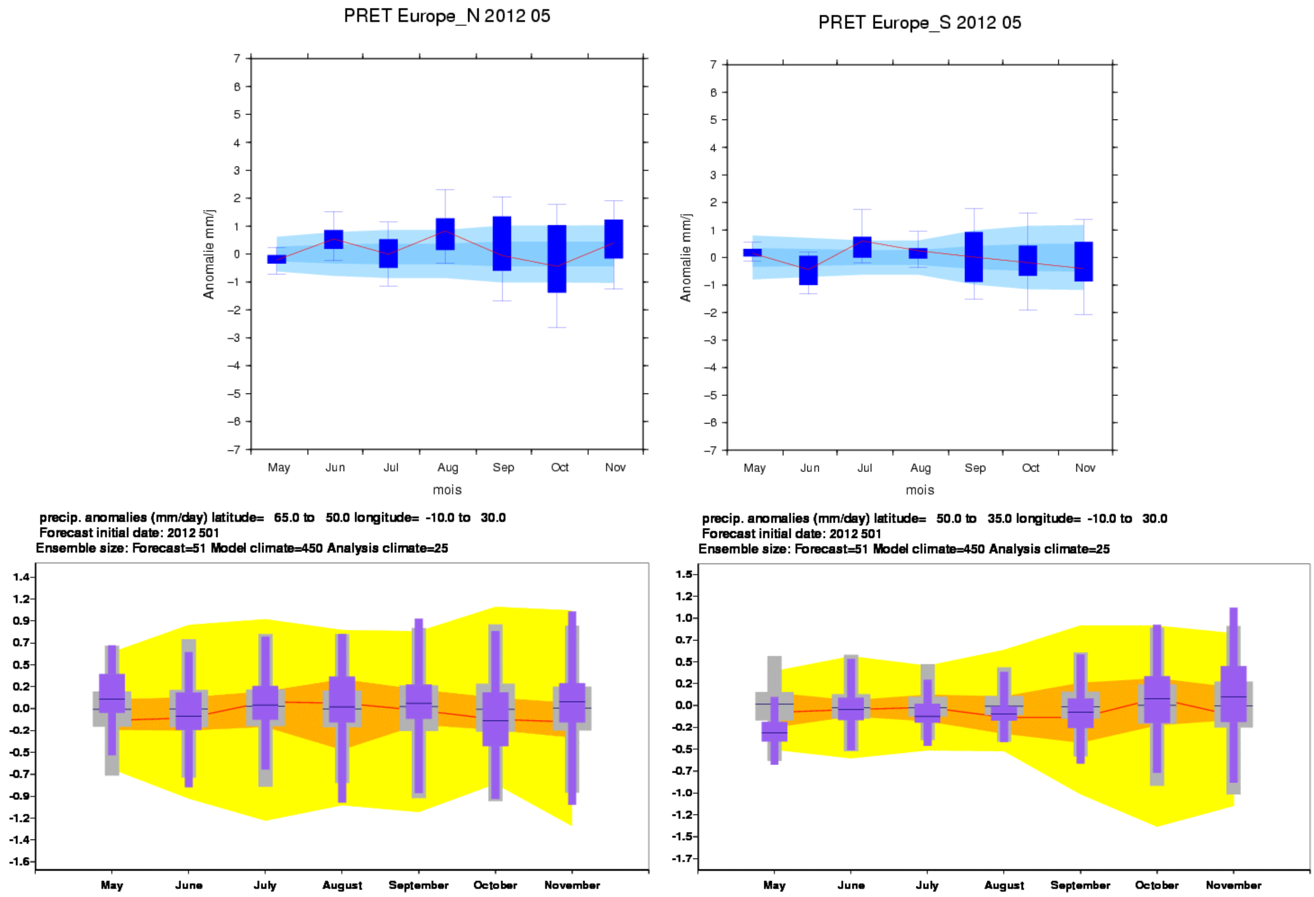


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in May.

For Northern Europe MF tends to forecast slightly Above normal conditions while there is No Signal in ECMWF. In MF ROC are slightly above 0.5 from May to July and then close or below climatology. For Southern Europe, the 2 models doesn’t show any consistency and, on average, give No Signal. The MF ROC scores show some skill in May, June and August and close or worst than climatology for the other months. So these intraseasonal evolution should be interpreted with caution.
Last, the predictability seems to be quite low (referring to the General Circulation discussion).

In Météo-France climagrams, the distributions of area averages are displayed for the seasonal forecast (dark blue boxes and wiskers), and the climate reference on the 29-year hindcast period (blue and light blue bands). The limits of the boxes (ensemble forecast) and blue band (climate reference) correspond to the upper and lower terciles. The limits of the wiskers (ensemble forecast) and light blue band (climate reference) correspond to the mean + 1 standard deviation and the mean – 1 standard deviation. The red line corresponds to the ensemble mean.

II.6. MODEL'S CONSISTENCY

II.6.a GPCs consistency maps

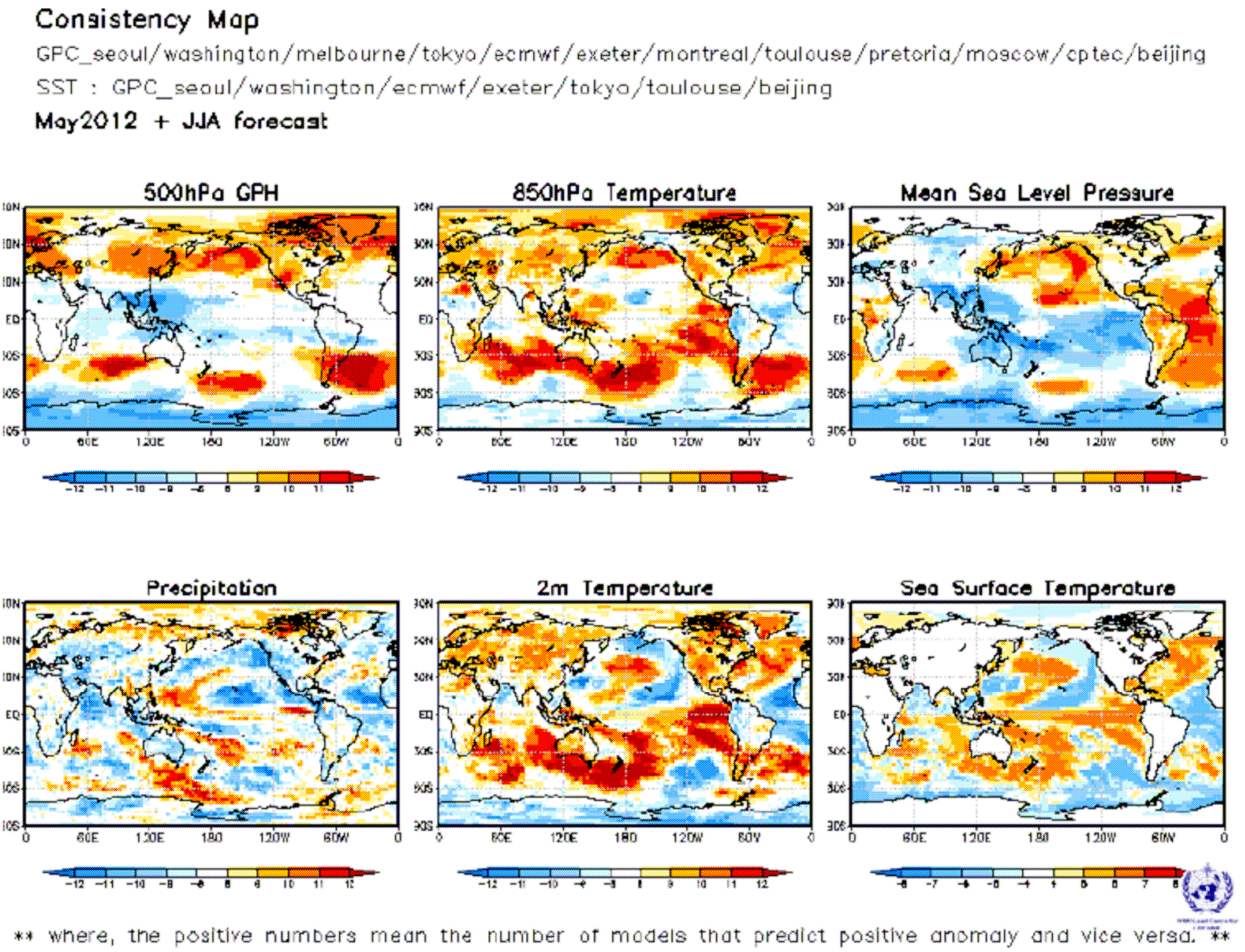


fig.37: GPCs Consistency maps from LC-MME http://www.wmolc.org/

For T2m, over most of the Northern hemisphere, the models are quite consistent with a positive anomaly covering all the continental surfaces, excepted for the Indian sub-continent and South East Asia and regions close to Alaska. So the Euro-SIP forecast is likely a very good synthesis to take on board.
For precipitation, there is less consistency. However, one can notice the tendency already pointed out in Euro-SIP for Above normal conditions in the most Northern part of Europe and Below normal conditions over the Eastern Europe.

II.7. "EXTREME" SCENARIOS

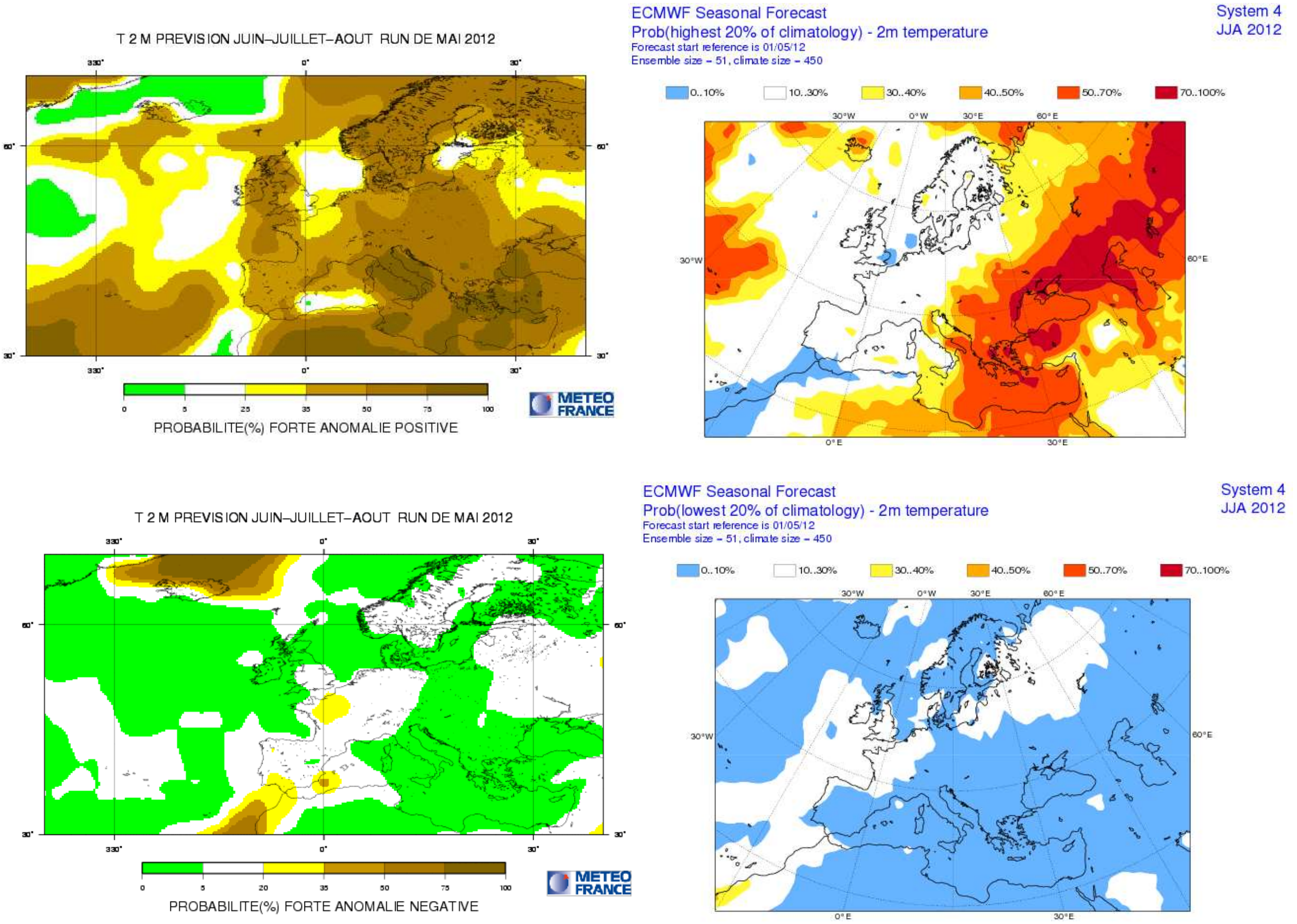


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right – lowest 20% of the distribution).
For June-July-August, issued in May.

There is some very consistent signal over South Eastern Europe for enhanced probabilities of very above normal scenario. Also to be quoted that the probability of very Below Normal scenario is very low everywhere. In Météo-France the ROC score is really above climatology for the very above normal scenario (locally it can reaches 0.8) indicating some skill for the forecast over these regions. To be notice that there is some lack of skill on the Northern part of Scandinavia and UK.

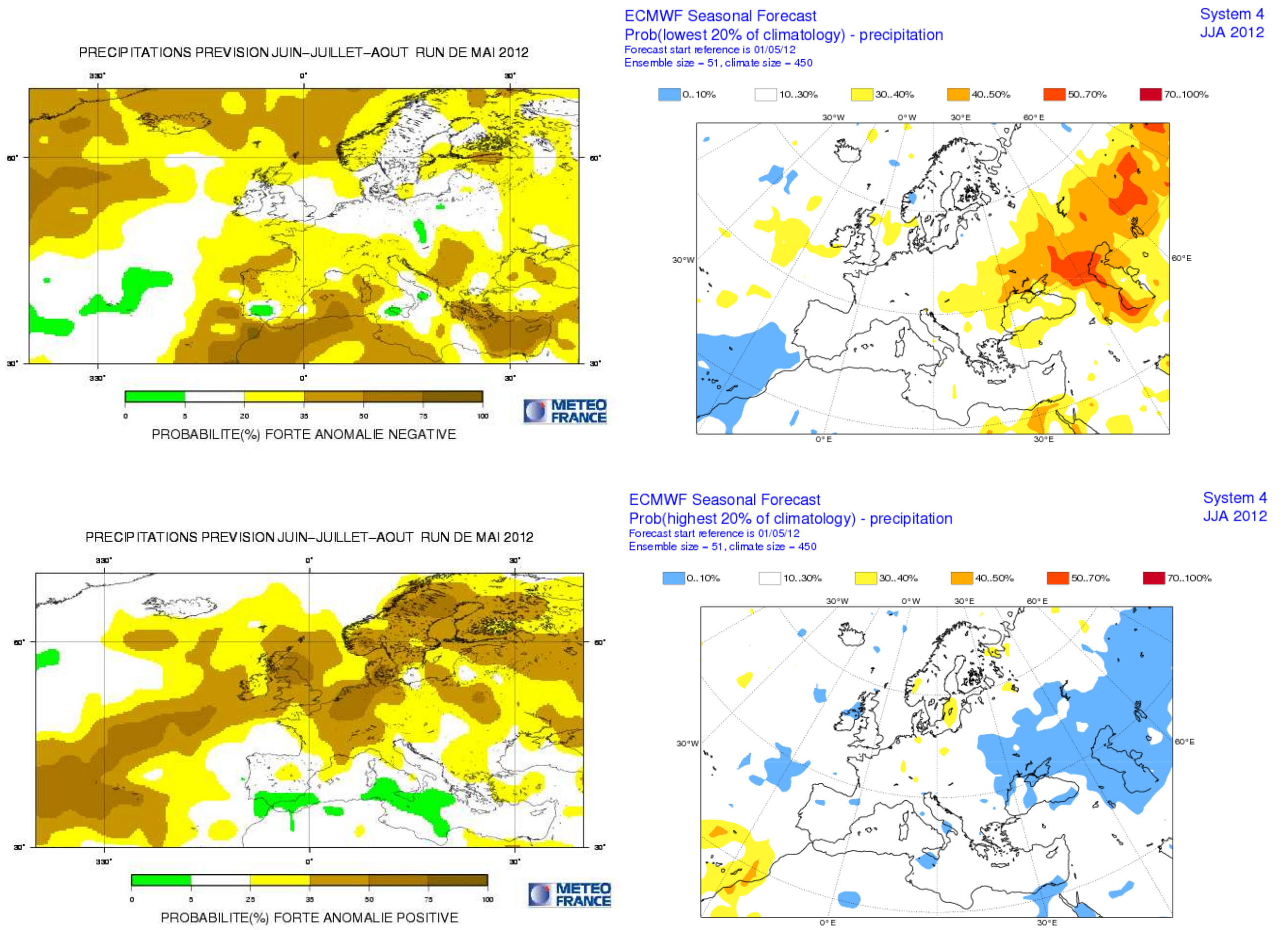


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right – highest 20% of the distribution).
for For June-July-August, issued in May.

For the very Below and Above Normal scenarios, even if the probabilities are high in Meteo-France (likely in relationship with the Stream Function anomalies) there is no consistency between the 2 models. When adding the low predictability consideration, it's seems difficult to infer any useful information from these forecast.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

The first comment is about the predictability. Referring to the general Circulation discussion, it seems difficult to infer a clear predictability for Europe (even if some could exist over the Mediterranean basin).
Then it seems that the excess of Blocking regimes in MF is mainly due to tan unrealistic climate trend which pollute the summer forecast.
For temperature, whatever the reasons, the Above Normal scenario makes sense for most of European countries. However, one have to quote that there is more uncertainty for the western façade of Europe.
For rainfall, the predictability is low which lead to No Privileged Scenario over most of the European continent. However, some consistent signal seems to exist on the most northern part of our regions.
However, some downscaled information could details these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

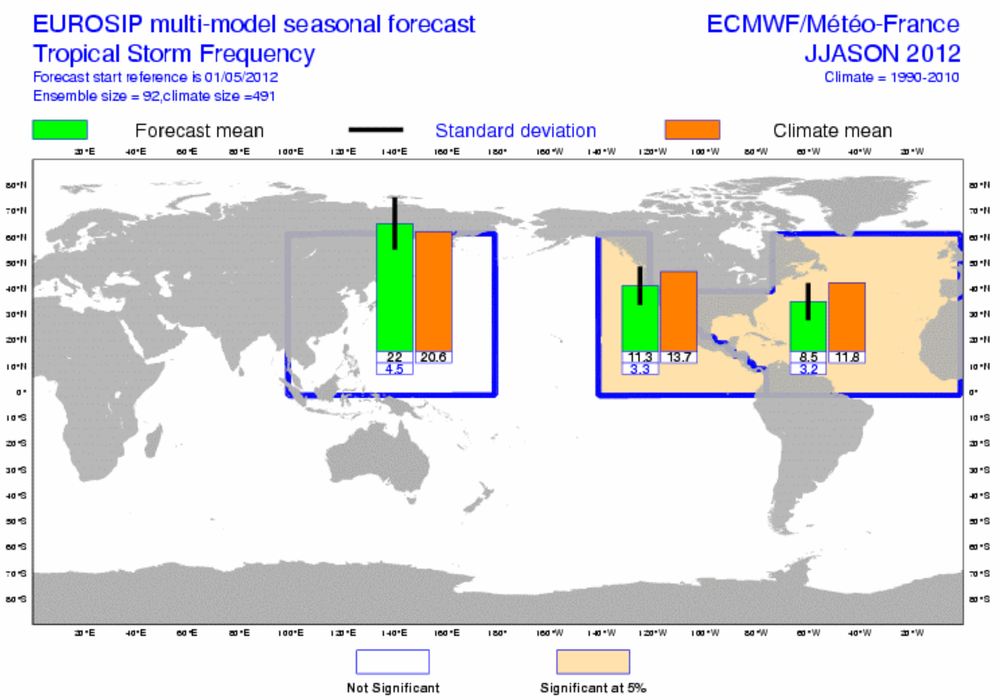


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the June to November 2012 period, issued in May.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the beginning of the season in the Northern hemisphere, Euro-Sip forecasts indicate a below to normal cyclonic activity over the Tropical Atlantic and Eastern Pacific and No Signal over West Pacific. To be notice that over the Tropical Atlantic, this is consistent with the SST evolution over the Atlantic North to the equator and to the ITCZ activity over the western part of West Africa.

Synthesis of Temperature forecasts for June-July-August 2012 for European regions

Results are expressed with respect of 3 possible scenarios : « Above normal », « close to normal » and « Below normal ». The limits between each category is given by the corresponding tercile such that each scenario have the same climatological probability of occurrence (33,3%). If the forecast shows no specific signal (because of low predictability and/or divergent scenarios between several models), the cell is filled in grey and "No privileged scenario" is indicated.

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
CEP	no privileged	no privileged	above normal	above normal	above normal
MF	above normal	above normal	above normal	above normal	above normal
Met Office	no privileged	no privileged	above normal	above normal	above normal
JMA	no signal	no privileged	above normal	above normal	above normal
synthesis	no privileged	no privileged	above normal	above normal	above normal
IRI	above normal	above normal	above normal	above normal	above normal
Eurosip	above normal	above normal	above normal	above normal	above normal
privileged scenario by RCC-LRF node	***above normal***	***above normal***	***above normal***	***above normal***	***above norm***

T Below normal (Cold) | T close to normal | T Above normal (Warm) | No privileged scenario

Synthesis of Rainfall forecasts for June-July-August 2012 for European regions

Results are expressed with respect of 3 possible scenarios : « Above normal », « close to normal » and « Below normal ». The limits between each category is given by the corresponding tercile such that each scenario have the same climatological probability of occurrence (33,3%). If the forecast shows no specific signal (because of low predictability and/or divergent scenarios between several models), the cell is filled in grey and “No privileged scenario” is indicated.

MODELS	**Northern Europe**	**Southern Europe**	**Central Europe**	**Eastern Europe**	**SEE Region**
CEP					
MF					
Met Office					
JMA					
synthesis					
IRI					
Eurosip					
privileged scenario by RCC-LRF node	***above normal***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***

RR Below normal (Dry)   RR close to normal   RR Above normal (Wet)   No privileged scenario

III. ANNEX

III.1. SEASONAL FORECASTS

Presently several centres provide seasonal forecasts, especially those designated as Global Producing Centres by WMO (see http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html).
■ BoM, CMA, ECMWF, JMA, KMA, Météo-France, NCEP and UK Met Office have ocean/atmosphere coupled models. The other centres have atmospheric models which are forced by a SST evolution which is prescribed for the entire period of forecast.
■ IRI and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 3 models (ECMWF, Météo-France and UK Met Office). IRI uses several coupled and forced models optimally combined.

Seasonal forecasts use the ensemble technique to sample uncertainty sources inherent to these forecasts. Several Atmospheric and/or oceanic initial states are used to perform several forecasts with slightly different initial state in order to sample the uncertainty related to imperfect knowledge of the initial state of the climate system. When possible, the model uncertainty is sampled using several models or several version of the same model. The horizontal resolution of the Global models is currently between 100 and 300km. This mean that only Large Scale feature make sense in the interpretation of the issued forecasts. Generally speaking, the temperature forecasts show better skills than rainfall forecasts. Then, it exists a natural weakness of the seasonal predictability in Spring (ref to North Hemisphere).

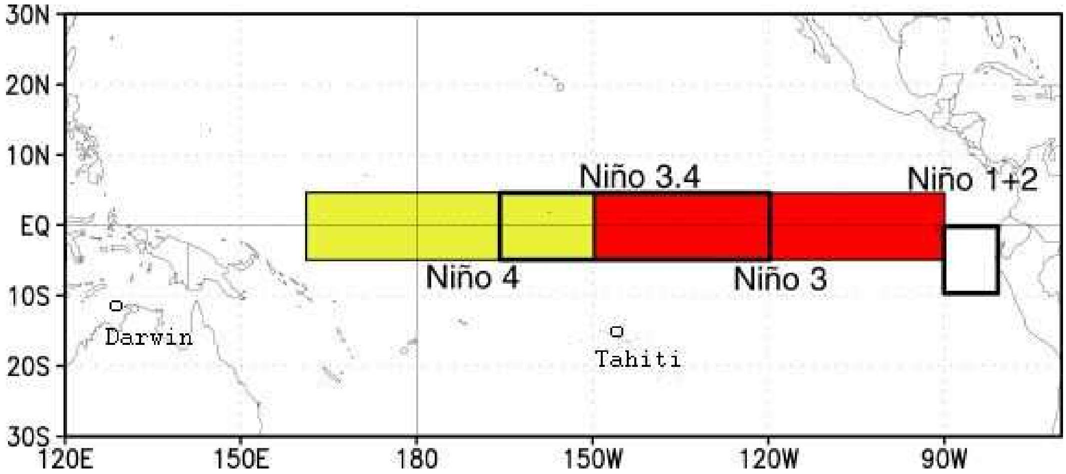
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/) ; scores are also available at the specific web site of each centres.

This bulletin collects all the information available the 21st of the current month preceding the forecasted 3-month period.

III.2. « NINO » AND SOI INDICES

El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- Niño 1+2 : 0°/10°S 80W-90W ; it is the region where the SST warming is developing first at the surface (especially for coastal events).
- Niño 3 : 5°S/5°N 90W-150W ; it is the region where the interanual variability of SST is the greatest.
- Niño 4 : 5°S/5°N 160E- 150 W ; it is the region where SST evolution have the strongest relationship with evolution of convection over the equatorial Pacific.
- Niño 3.4 : 5°S/5°N 120W-170W ; it is a compromise between Niño 3 and Niño 4 boxes (SST variability and Rainfall impact).



Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea level pressure at Tahiti minus standardized sea level pressure at Darwin (see above figure). It represents the Walker (zonal) circulation and its modifications. Its sign is opposite to the SST anomaly meaning that when the SST is warmer (respectively colder) than normal (Niño respectively Niña event), the zonal circulation is weakened (respectively strengthened).

III.3.LAND BOXES

Some forecasts correspond to box averaged values for some specific area over continental regions. These boxes are described in the following map and are common to ECMWF and Météo-France.